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THE

NATURALIST:

A

MONTHLY JOURNAL OF

Natural History for the North of England

EDITED BY

W. H. PEARSALL, D.Sc., F.L.S., and W. R. GRIST, B.Sc.,
THE UNIVERSITY, LEEDS*with the assistance as referees in special departments of*

J. M. BROWN, B.Sc., F.R.E.S.

W. H. BURRELL, F.L.S.

CHRIS. A. CHEETHAM, F.R.E.S.

RALPH CHISLETT, F.R.P.S., M.B.O.U.

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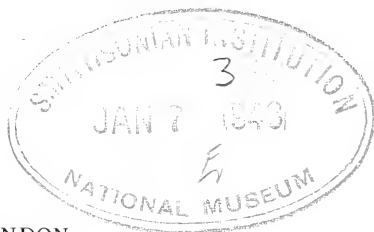
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W. A. SLEDGE, Ph.D.

H. C. VERSEY, D.Sc., F.G.S.

1942.



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PRINCIPALLY FOR THE NORTH OF ENGLAND

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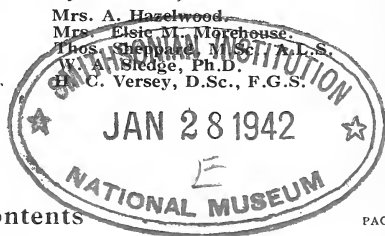
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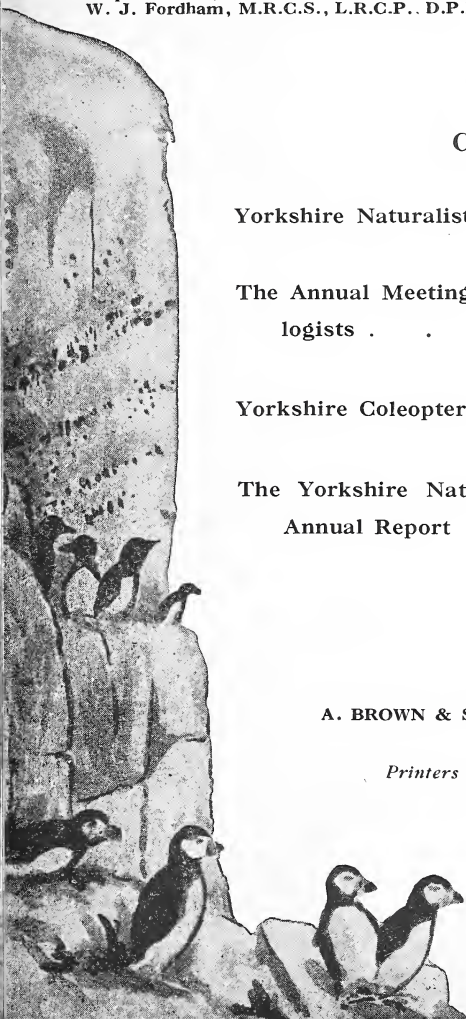
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Convener and Rep. on Executive : CHRIS. A. CHEETHAM,
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The constitution consists of the President, Treasurer, and Secretary of the Union, and the Chairman of each of the Sections and Committees, and the Divisional Secretaries.

A MEETING of this Committee and all members interested in **ECOLOGY** will be held at LEEDS UNIVERSITY in the BOTANY COMMON ROOM (Beech Grove Terrace) on Saturday, February 7th, 1942, at 3-30 p.m., to discuss a method to unite the work of the Botanical, Zoological and Geological Sections in this aspect of the Union's activities.—C.A.C.

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THE NATURALIST ^I

FOR 1942

YORKSHIRE NATURALISTS' UNION ANNUAL MEETING 1941

THE Annual Meeting of the Union was held in the Yorkshire Museum, York, on Saturday, December 6th, by kind invitation of the Yorkshire Philosophical Society and the York and District Field Naturalists. The President of the York Naturalists, Mr. Stanley Allen, welcomed the members to York. It was announced that Prof. A. C. Hardy, M.A., D.Sc., F.R.S., of Hull University College, had accepted the office of President of the Union for 1942. The retiring President, H. C. Versey, D.Sc., F.G.S., gave his Presidential address on 'The Building of York-shire.' We hope to see this published in *The Naturalist* at a later date.

At the meeting of the General Committee it was suggested that a means of unifying the ecological activities of the various sections should be found, and it was agreed that the Committee of Suggestions and all interested in ecology should meet at Leeds on February 7th, for this purpose, and that a notice should be put on the cover of the journal.

THE ANNUAL MEETING OF THE YORKSHIRE ENTOMOLOGISTS

THE Annual Meeting of the Entomological Section of the Y.N.U. was held in the Church Institute, Albion Place, Leeds, on Saturday, October 25th, under the Chairmanship of the President, Mr. E. G. Bayferd. Some twelve Members and Associates were present. Owing to difficulties of travel and the "black-out," the meeting was confined to the afternoon session. In spite of the adverse political situation and the absence of many Members, exhibits were up to the usual standard in both quantity and quality.

After the routine business of the meeting had been completed, Members passed to the examination of the exhibits. From Mr. H. J. Burkill, who could not be present, came a very interesting collection of galls including *Alax papaveris* (Perris) on *Papaver rhæas* (L.), *Liposthenes latreillei* (Kieff) on *Nepeta hederacea* (Trev.), *Oxyina flavipennis* (Lw.) on *Achillea millefolium* (L.), and lastly incipient galls of *Saperda populnea* (L.), a Longicorn Beetle on *Populus canescens* (Sm.).

Mr. H. Spiliers brought an interesting series of the Clouded Yellow Butterfly (*Colias edusa*) in very fine condition, taken by him in a field near Elland. Many Members here commented upon the prevalence of this interesting migrant in Yorkshire during the past summer.

Mr. Procter exhibited a specimen of the rare V-pug (*Eupithecia coronata*) taken at Temple Newsam in July.

Mr. C. A. Cheetham showed and commented upon the most interesting Diptera taken by him during the year. These included specimens of *Pelma aenea* (Hal.) from Roche Abbey, *Tipula peliostigma* (Schum) from Ingleton, both new to Yorkshire, while a specimen of the large Tachinid *Echinomyia fera* (L.) from Austwick Moss, was the second specimen of this insect to be taken in the county.

The President, Mr. E. G. Bayford, showed an example of the rare Wood-boring Weevil, *Anisandrus dispar*, which constitutes a county record, and a specimen of the German Cockroach which has apparently established itself in the Barnsley area.

Mr. W. D. Hincks exhibited a box of insects, principally Coleoptera, including an interesting series of Halcitids and specimens of the beautiful Chrysomelid Beetle, *Chrysomela graminis* (L.), from Kelfield, a new locality which represents an interesting extension to its known range. Mr. Hincks also showed new books dealing with entomological subjects.

Mr. J. Wood showed a large box of exquisitely mounted insects, principally Hymenoptera, but including examples from many orders.

Mr. M. D. Barnes, a small number of uncommon Yorkshire Coleoptera including a specimen of *Cæloides erythroleucus* from Buttercrambe Woods, a new county record.

After an interesting discussion on the exhibits the Members dispersed.

YORKSHIRE COLEOPTERA IN 1941

W. J. FORDHAM, M.R.C.S., L.R.C.P., D.P.H.

CONSIDERING the times a fair amount of work has been done in the order Coleoptera during the year 1941. Three species new to the county have been taken and numerous additions made to distribution. Species new to vice-counties are indicated by an asterisk. The captors names are :

M.D.B.	M. D. Barnes, Huddersfield.
E.G.B.	E. G. Bayford, Barnsley.
J.H.F.	J. H. Flint, Leeds.
W.R.F.	W. R. Flint, Leeds.
W.D.H.	W. D. Hincks, Leeds.
T.S.	T. Stainforth, Hull.
G.B.W.	G. B. Walsh, Scarborough.

Species new to the county are :

Scymnus hæmorrhoidalis Hbst. Skipwith Common, W.D.H. (61), 13/9/41. A southern type, not recorded north of Cumberland. Occurs in the Isle of Man and in Sherwood Forest. Found by beating, sweeping, and often in moss.

Cæloides erythroleucus Gl. Buttercrambe Woods (62), M.D.B., by sweeping, 11/5/41. Usually regarded as rare. Common in the Midlands. Occurs in South Scotland and Ireland. Taken by beating, young Oaks in woods and copses. Occurs in Nottinghamshire and Lincolnshire.

Anisandrus dispar F. Barnsley. (63), E.G.B. A male which fell on to a table in an office. The male of this species is extremely rare. It is found in decaying oaks and grows the fungus *Monilia candida* in its galleries. It is preyed on by *Salpingus ater*, a heteromorous beetle. It has only previously been taken in the South of England.

New localities for species already in our list are :

Carabus arvensis Hbst. Horton-in-Ribblesdale, crawling on path in sunshine, 1/6/41, W.R.F.

Dyschirius politus Dj. Barmby-on-the-Marsh (61), 2/8/41, M.D.B. Only recorded from Bridlington.

Chlænium vestitus Pk. Beacon Hill, Flamborough Head (61), between Danes Dyke and South Sea Landing. Fairly common on wet places on the slopes of the glacial beds above the chalk cliff near beds of *Equisetum maximum*, 14/8/41, T.S. The original Bridlington locality, namely, the glacial cliffs towards Sewerby, has been destroyed by improvements.

Lyperosomus angustatus Duft. Middleton, Leeds, 27/9/41, J.H.F. Mr. Flint writes : ' I examined the ground on which I first took this species in 1939 and found seven specimens. These were all taken under small stones on one small patch of bare sandy ground on a steep slope. I examined similar patches of bare ground in the immediate vicinity, but failed to find any specimens of *angustatus*. Search under stones among the grass and moss on the slope also failed to reveal any specimens, bearing out my observations in 1939 that the species was only to be found on absolutely bare ground at any rate in this area.'

Bempidion atrovioleaceum Duf. (*stomoides* Dej.). One example E. Riding bank of River Ouse, Cawood (*61), 12/7/41, T.S.

- Bempidi andreæ* F. Pickering (62), 13/7/41, M.D.B.
B. litorale Ol. Boroughbridge (64), 11/7/41, M.D.B. Linton-on-Ouse, 26/7/41, M.D.B.
Trechus discus F. Elvington (61), decaying vegetation, 24/8/41, M.D.B.
Noterus sparsus Marsh. (*crassicornis* Sturm.). Kelsey Hill, Keyingham (61), 16/6/41, T.S.
Copelatus ruficollis Schal. Fairly common, Kelsey Hill, Keyingham 17/5/41, 22/5/41, T.S.
Berosus affinis Br. Sand Hutton, common in sandpit pond (*62), 11/5/41, M.D.B.
Limnebius nitidus Mm. Rievaulx (62), 13/4/41, M.D.B.
Gyrophæna lævicollis Kr. Deffer Woods (*63), 27/9/41, W.D.H.
Quedius ochripennis Men. Deffer Woods, 27/9/41, W.D.H.
Philonthus carbonarius Gyll. Cawthorne Woods (*63), 1/10/41, W.D.H.
P. rectangulus Shp. Bretton Hall Park (63), 29/9/41, W.D.H.
Oxyporus rufus L. Wentbridge (63), 21/7/41, M.D.B.
Lathrinæum atrocephalum Gyll. Deffer Woods (*63), 27/9/41, W.D.H.
Nephanes titan Newm. Brocoddale, Wentbridge, in old wood, 8/41, E.G.B. (*63).
Scymnus redtenbacheri Muls. Deffer Woods (*63), W.D.H.
Triplax ænea Schal. Armley, Leeds, 25/5/41, abundant on fungus and under bark on one tree, J.H.F.
Cerylon ferrugineum Steph. Temple Newsam, Leeds, 10/37, J.H.F. (*64).
Micropeplus porcatus F. Wentbridge, on sand by River Went (*63), M.D.B.
Carpophilus sexpustulatus F. Askham Bog (*64), by sweeping, M.D.B.
Telmatophilus typhæ Fall. Kelsey Hill on *Typha latifolia*, especially plants attacked by the caterpillar of the bulrush moth, 6-9/41, T.S.
Esolus parallelopipedus Ml. Rievaulx, common in stream, 15/4/41, M.D.B.
Heterocerus marginatus F. Linton-on-Ouse (62), 27/7/41, M.D.B.
Hoplia philanthus F. Boroughbridge (64), in river, 11/7/41, M.D.B.
Cryptohyphus 4-pustulatus F. Barmby-on-the-Marsh, 28/41, M.D.B.
Cyphon padi L. Buttercrambe Woods, 11/5/41, M.D.B.
Scirtes hæmisphericus L. Kelsey Hill, very common on marsh plants, 14/6/21, 29/6/41, T.S.
Lampyrus noctiluca L. Newbridge, Pickering, a female on hillside, 12/7/41, M.D.B.
Malthodes fibulatus Kw. Grass Wood, Grassington (*64), 7/6/41, M.D.B.
Thanasimus formicarius L. Rievaulx, a number together with larvæ beneath bark of dead tree, 13/4/41, M.D.B.
Anaglyptus mysticus L. Pickering (*62), G.B.W.
Leiopus nebulosus L. Cookridge, Leeds, swept off *Lamium amplexicaule*, 23/6/41, W.R.F.
Donacia simplex F. and *ab sanguinea* West. Sicklinghall, 23/7/41, W.D.H.
D. vulgaris Zsch. Kelsey Hill, on leaves of *Typha*, 17/5/41, 22/5/41, 16/6/41, T.S.
Cryptocephalus aureolus Su. Pickering, swept from rank vegetation, 12/7/41, M.D.B.
Chrysolina graminis L. Riccall (*61), 9/6/41, W.D.H.
Longitarsus ochroleucus Marsh. Harewood (*64), 19/7/41, W.D.H.
L. succineus Fd. Little Ribston (*64), 5/8/41, W.D.H.
Phyllotreta atra F. Shadwell (*64), 11/6/41, W.D.H.
Chætocnema hortensis Sf. Skipwith Common (*61), 13/9/41, W.D.H.
Rhynchites mannerheimi Hum. Yearsley Moor (62), on birch, 18/7/41, M.D.B.
Tanymecus p-alliatus F. Pickering, 6/5/39, M.D.B.
Scolytus intricatus Ratz. Deffer Woods, 27/9/41, W.D.H.
Xyloterus signatus F. Coxwold (*62), in old oak, single specimen, 14/4/41, M.D.B.

THE YORKSHIRE NATURALISTS' UNION'S EIGHTIETH ANNUAL REPORT

(Presented at York on Saturday, December 6th, 1941)

The Seventy-ninth Annual Meeting was held at Bradford Technical College on December 7th, 1940, as the black-out and the restricted travelling facilities made it impossible for the Meeting to be held at Scarborough as intended. The Annual Report was presented there, and was printed as a whole in the January issue of *The Naturalist*.

The Presidential Address on 'Yorkshire Associations, Lichenological and Otherwise' was given by Dr. W. Watson, A.L.S., and is printed in *The Naturalist* on pp. 29-40.

The Presidency for 1942 has been offered to and accepted by Prof. A. C. Hardy, M.A., D.Sc., F.R.S., of Hull University College.

The Excursions for 1942 will be as follows :

May 23rd-25th. Tadcaster for V.C. 64.

June 6th. South Cave for V.C. 61.

June 27th. Boroughbridge for V.C. 65.

July 18th. York, Clifton Ings, for V.C. 62.

August 1st. Huddersfield, Shepley, for V.C. 63.

New Members elected during the year :

Miss M. E. Ackerley, Mitton Vicarage, Whalley, Blackburn.

Mr. W. del Aitchison, M.A., Coupland Castle, Wooler, Northumberland.

Mr. Percy Baldwin, Woodside, Methley, Leeds.

Mr. R. B. Cooke, Kilbryde, Corbridge, Northumberland.

Mr. J. M. Craster, J.P., Crastertower, Alnwick, Northumberland.

Miss A. F. G. N. Evershed, Crossley and Porter School, Saville Park, Halifax.

Mr. W. S. English, M.D.H., 3 Montpelier, Cliffe Road, Leeds, 6.

Mr. J. W. Ford, The Croft, Kirk Deighton, Wetherby.

Mr. A. Gilpin, 7 Melville Grove, Leeds, 6.

Miss R. M. T. Grey, "Braeside," Woodside Villas, Hexham, Northumberland.

Mr. W. J. Hardie, 17 Graham Park Road, Gosforth, Newcastle-on-Tyne.

Rev. P. Alwyn Kelsey, Caledonian Road, Workington, Cumberland.

Mr. Edgar Lund, 101 Kings Road, Harrogate.

Mr. A. A. Lisney, M.A., M.D., F.R.E.S., Red House, Narborough, Leicestershire.

Mr. K. G. Payne, 123 The Mount, York.

Mr. R. Procter, 20 Beeston Royds, Leeds, 11.

Mr. B. Shaw, Fell Close, Woodside, Bradford Road, Huddersfield.

Miss P. J. Swaine, B.Sc., Holm Lea, New Road, Netherthong, Holmfirth.

Mrs. P. Sibley, Glenlui, Ballater, Aberdeenshire.

Rev. W. L. Schroeder, M.A., Parson's Cottage, Colby, Isle of Man.

Mr. H. Tully, Newton Hall, Stocksfield-on-Tyne.

Mr. C. W. Wright, B.A., F.G.S., Tower House, North Ferriby, E. Yorks.

Mr. E. C. Wallace, 2 Strathearn Road, Sutton, Surrey.

Mr. R. Wagstaffe, The Museum, York.

Mr. Denis Wade, 17 Waldegrave Avenue, Holderness Road, Hull.

Mr. J. Sample Wheatley, 49 Prospect Mount Road, Scarborough.

Resignations :

Mr. H. W. Carmichael, North Cave.

Mr. T. Flintoff, Kersal, Manchester.

Mr. A. H. Gander, Leeds.

Miss L. Gleadhall, Peterborough.

Dr. R. G. S. Hudson, Keighley.

Mr. H. P. Ripley, Huddersfield.

Mr. W. Smith, Hull.

Mr. L. Smith, Hereford.

Mr. F. Stell, Douglas.

Mrs. Tunbridge, Leeds.

Changes of Address :

Mr. E. Dearing to 17 Bayfield Road, Liverpool, 19.

Miss M. Lee to 5 Saltburn Place, Toller Lane, Bradford.

Miss M. Lee, from Richards Street to 43 Broomfield Grove, Rotherham.

Mr. F. E. Milsom to High Cross, Kirkburton, Huddersfield.

Dr. W. A. Sledge, from Weetwood Lane to 9 St. Chad's Drive, Leeds, 6.

Mr. T. Sheppard, from Museums to 46 Anlaby Park Road, Hull.

Mr. J. Wright, from Halifax to 10 Empsall Place, Camm Street, Brighouse.

Obituary.—The death of Mr. H. B. Booth is a heavy blow to the Union, especially to the Vertebrate Section. He was President of the Union in 1921 and was a member of the Executive from 1906. Sir A. C. Seward, who died early this year, was our President in 1910, and consequently was our oldest Vice-President. Alderman A. Hirst is another loss this year ; he was President of Section B, Vertebrate Zoology, in 1935 and 1936. Mr. G. H. Caton Haigh, of Grimsby, was one of the oldest members of the Union and a well-known ornithologist. Mr. R. J. Flintoff, of Goathland, was less generally known to our members, but he was a keen ecological worker in his own district. Mr. M. Bywater, of Bradford, Mr. C. Greaves, of Holmfirth, and Mr. A. E. Peck, of Scarborough, have to be added to this list, the latter was well known for his work on the fungi.

The Naturalist.—The standard of contribution has remained at a high level. Restriction on the use of paper has meant the delay in publication of many items, and war-time conditions generally have disturbed the normal routine. Our publishers have all co-operated in every possible way in spite of grave difficulties brought about by enemy action.

BOTANICAL SECTION

(Chris. A. Cheetham).—The year 1941 has been like 1940, a case of abnormal weather. The reports of Mr. Wattam and Mr. Malins Smith draw attention to this, and the resulting effect on the vegetation has been noted by most observers. Some variation in districts may be noted ; here at Austwick we have one of the best crops of hazel nuts of the last ten years, whilst Mr. Wattam finds it poor near Huddersfield. He says cowberry and bilberry are very moderate, while Mr. Cross, writing from Scarborough, says : bilberries have been a heavier crop than for many years past, and one small holder in our district has paid his rent with them. Cowberries have also been abundant, and I have seen them in the Scarborough market for the first time. Near Kirbymoorside quantities of the stone bramble have been gathered and made into jam. Brambles have been a very large crop. Hips have also been preserved, after removing the seeds, for their large vitamin content.

The cloudberry crop on Penyghent was a very good one, and cranberries are plentiful on the mosses, but this is not the case in the Huddersfield district. No one mentions a good plum crop. Mr. Cross says pears and apples are very poor on the East Coast. Mr. J. W. H. Johnson says that at Wakefield pears are moderate and apples good. Generally speaking orchards have an odd apple tree full, but generally the crop is poor and we have no fruit on the trees in the hedgerows. Wild rose bushes are a fine sight, elders hang down with berries, and there will be no lack of holly this year, though Mr. Johnson says rose and holly are only fair at Wakefield. Lime and beech are well fruited, ash is normal, some trees, I would say one in five, are fairly well fruited, but one has to look carefully to find acorns on any of the oaks, and the sycamore is much below normal. One effect of the prolonged dry cold spell around May was the slow growth of the grass crop of the fields, and this was

overgrown by the buttercups which made a fine show of yellow bloom. The hay crop was light but good, and the second growth is heavy and being cut for silage in October. Many plants made a fine display of flowers for a short season, for instance, bird's foot trefoil, golden rod, heather; and soapwort was fine on the banks of the Swale at Brafferton. Orchids generally made a poor show of flowers, and all spring flowers were late. The purple saxifrage was not out until March 19th on Pen-yghent, and it was June 5th before may-blossom was seen at Austwick. Secondary growth was fairly plentiful on the oak but not very evident on other species.

The mushroom crop has been good and prolonged.

Fruiting in the Shipley District, 1941 (A. Malins Smith): The main features of the weather of 1941 were strikingly similar to those of 1940. Again there was severe frost, but not so prolonged or severe as in 1940. Again there was a prolonged drought in early summer, followed by a wet period in late July and August. The chief feature of difference was the great delay in the arrival of warm weather in the spring of 1941. I should estimate that in 1941 we had the latest and coldest spring which I have ever experienced.

In the result, 1941 has on the whole proved a poor fruiting year. Though with varying emphasis we may say that our main trees, the oak, beech, ash, sycamore, rowan, hawthorn, and alder have moderate or poor crops. Of these the oak is the worst fruiter, and acorns, though not absent, are very few. The ash is undoubtedly better and a few trees have good crops, though the majority have moderate or poor crops. In the beech, too, which was notable for a great display of flowers, male catkins strewing the ground in enormous numbers afterwards, the general crop of fruits is poor, though an occasional tree is well-fruited. The sycamore shows many trees, I think a majority, without fruits. In the remainder fruits are general over the whole tree, but the tassels are individually poor, consisting of one or two fruits only. Only a rare tree has a big crop of full-fruited racemes. That usually reliable fruiter, the alder, has only moderate to poor crops. The rowan in many places was devastated by a caterpillar plague and its crop is only moderate, though in gardens and such semi-protected situations the crop is good. The haw crop is only moderate, and the hedges and isolated hawthorns are not showing their usual amount of colour at this season.

As to apples I have not seen a single crab apple in the district, though the cultivated apples of our area show good crops. Cultivated plums and pears are almost absent, and wild sloes entirely so. We have no horse chestnut fruits. On the other hand a few species have fruited well. Outstanding among these is the elder, which I think has excelled its usual high average. The holly, too, has done well, and most female trees are showing good crops of berries which will redden later. The lime has flowered and fruited well. The hazel, though not heavily-cropped, shows more nuts than usual in this neighbourhood, where it is generally a very poor fruiter. All the roses have cropped exceedingly well and blackberries also are abundant. The guelder rose is fairly good, the honeysuckle and black bryony good, and the woody nightshade very good in fruit production. The raspberry and bilberry crops were both moderate. If this list is carefully examined it will, I think, show that the good fruiting is almost entirely among the later flowering plants, and if so, it points to the disastrous effect on fruiting of the prolonged cold weather of May and early June. This seems to me to be the cause of the generally much poorer fruiting of 1941 than of 1940.

Secondary growth has been about average in amount.

There has been much more corn grown owing to war policy and in general the crops have been good. At higher elevations on the edge of moorland, however, the crops have been poor and the dull and wet August has made them very late, so that many fields of oats in this kind of situa-

tion have had to be cut very green. The immediate cause of the poor crops of oats was a very heavy and widespread attack of the frit fly, which was also in evidence in many fields where the final damage was not great. In spite of failure in these special situations, the aggregate result of the summer is a very great increase in the cereal food supplies of the nation.

The time of flowering of plants was late, *e.g.* the first coltsfoot I saw was on March 23rd (March 16th, 1940), and the first celandine on April 12th (March 25th, 1940). The season remained cold for a long time and I saw my first wild rose as late as July 1st (June 12th in 1940).

The drought again had an adverse effect on the flowering of devil's bit scabious, and it seems as if one or two more such seasons as 1940 and 1941 would possibly exterminate this species in some of its habitats in our area. The moonwort fern, too, has not appeared in either of these two years of drought, and this year for the first time for many years no frog orchids appeared in their usual Baildon station, which may also be a consequence of the drought. It is worth noting that the drought has an indirect effect as well as a direct, for when grass is in short supply, grazing by animals is much closer than in wetter times, and those plants like the three mentioned above whose habitat is in grazed fields are much more liable to have their early growth destroyed by grazing than in more normal years.

The early summer was notable for the great abundance of ash seedlings, and I observed this not only in this district but also at Ingleton in the west and at Aberford to the east. I have had opportunity to notice also the fruiting in the Upper Swaledale area round Keld, where the outstanding feature was the enormous crops of hips on the downy rose, and in the Collingham area where the ash was fruiting uniformly heavily and where there were very good crops of orchard apples. *Orchis ustulata* flowered abundantly at Collingham, and occurred on the slope of Linton Common for the first time in my experience.

Huddersfield District Botanical Report, 1941 (W. E. L. Wattam) :

A second successive winter of exceptional severity commencing in January, during which month there were heavy snowfalls giving an average depth of 10 in. ; drifts in the more exposed places were from 4 to 5 ft. deep. The frost register varied from 8 to 15 degrees. A goodly promise in the early part of February did not last, and weather of an extreme wintry type prevailed practically throughout the remainder of the month, with heavy rainfall towards the close. March was a disappointing month. Strong gales during the opening half with severe frosty nights, especially on the evening of the 29th-30th. During the greater part of April strong easterly and northerly winds were experienced with severe night frosts. The lack of rainfall and the drying winds retarded vegetative growth. Up to May 17th winds from the north-east kept vegetation in check. During the night of the 12th-13th, after sleet showers during the daytime, 12 degrees of frost were registered which caused much damage to garden crops and cereal crops. Rainfall was still deficient. On the 23rd of this month a strong south-west gale caused much damage to the developing foliage of the trees. June brought little change. Up to the 14th vicious winds and a low temperature prevailed. A welcome change came on the 22nd when the temperature rose to 92 degrees, the highest ever recorded for our district. On the same day there were a succession of thunder storms with a welcome rainfall of $\frac{1}{2}$ in. July was bright and sunny with but little rainfall. August brought abundant rainfall which gave a much needed fillip to vegetation. In consequence of this mention should be made of the gorgeous and prolonged display which has been given by the umbelled hawkweed, golden rod, toadflax, harebell, and field knautia. Neither the ordinary woodland trees nor garden shrubs were much affected by the severity of the

wintry conditions. The extreme dryness of April and May resulted in flowering shrubs giving a quick display of bloom, the only exception being the laburnum, which lingered, furnishing magnificent pictures. The dryness and frosts did curtail the moorland vegetation, with the result that fruit crops were poor. Undoubtedly the outstanding fruiting crops of our woodland trees have been those of the elder, lime, and wild service, the lime in particular giving a most glorious display. The springtime and early summer flower displays were excellent but unequal as to longevity due to the lack of constant moisture. The drought may be said to be also responsible for the larger part of the oak fruits not maturing properly, whilst as regards the beech, so heavy in some instances was the crop that much 'mast' was cast immature. The late rainfall has caused a fair amount of secondary growth by the oak, chiefly by trees in the coal measures area.

SUMMARY OF FRUIT CROPS

PEAR. Excellent flowering period with a good fruit yield.

APPLE (cultivated). Quite good. WILD CRAB. Only moderate.

BROAD-LEAVED ELM. Only moderate. Most of the developing fruit was spoilt by frost and vicious winds.

SYCAMORE, ASH, and BIRCH. Somewhat variable in different parts of the district, but, taken as a whole, quite good.

ELDER. Magnificent heavy crop.

BEECH. Magnificent heavy crop. In the Cawthorn district very heavy castings of immature fruit had been made.

HORSE CHESTNUT. Quite good.

OAK. *Quercus sessiliflora*. Only a moderate crop on the coal measures. Very good crop on the sandstones, but large quantities of immature fruit. *Q. pedunculata*. Only very moderate. *Q. cerris*. Excellent. *Q. Ilex*. Only moderate.

WILD SERVICE. Magnificent heavy crop.

MOUNTAIN ASH. Excellent.

HAWTHORN. Quite good, but varying according to locality. In the more open localities the vicious winds destroyed much of the young fruit.

HAZEL. Poor.

ALDER. Quite good.

BRAMBLE. Excellent crop but maturing slowly due to lack of sunshine. Where growing in very dry situations large quantities of the fruit had shrivelled.

WILD ROSES (*Rosa canina* and *R. arvensis*). Excellent.

BILBERRY, BLACK CROWBERRY, CLOUDBERRY. All very moderate.

LIME. Magnificent both in flower and fruit. The outstanding feature of the year.

HOLLY. Magnificent flowering period, with quite good setting of fruit.

WILD CHERRY. Excellent flower display but fruit yield only moderate.

WALNUT. Excellent.

Ecological Committee (Miss D. Hilary): Since our last report the work of ecology has suffered a great loss in the death of Mr. R. J. Flintoff, of Goathland, whose very real interest in all ecological problems was well known to all and whose articles have so often appeared in *The Naturalist*.

Although, owing to difficulties of transport, it has not been possible to hold any field meeting this year, there is plenty of evidence that ecological work is still going on in all parts of the county. Articles already published during the year in *The Naturalist* include:

'Notes on the Growth of *Lunularia cruciata*,' by W. E. L. Wattam, March, 1941.

An article entitled 'Notes on Seeds and Seedling Plants,' by W. E. L. Wattam, May, 1941. This also includes some observations on 'Plant Life in New Ploughed Land.'

'The Germination of Seeds,' by R. J. Flintoff, September, 1941.

From Huddersfield comes the news of investigations by Dr. J. Grainger and Mr. F. W. Martin on the 'Ecology of Garden Crops.' These have resulted in the modification of allotment rotation of crops on ecological lines, the crops being regrouped so that soil conditions can be made best for them and at the same time bad for the diseases which attack them. A booklet entitled *Huddersfield Soils and Allotments* giving these results has been published by the Agricultural Committees of the Huddersfield County Borough Council and the surrounding Urban District Councils in association with the Tolson Museum.

Dr. Grainger also writes: The work on the ecology of Fungi is still progressing, though somewhat more slowly than in peace time. The results confirm the general outline published in the 1940 *Naturalist* for species growing on the ground, and further attention has been paid to those growing on wood. The observations on periodicity by Miss Grainger are still going on, but will require a few years before generalisations can be made.

Mr. A. Malins Smith, Chairman of the Committee, sends the following report on juniper in Upper Swaledale:—

As no opportunity arose of visiting the Moughton juniper this year, advantage was taken of a visit to Keld by the Chairman of the Ecological Committee to inspect the juniper of Upper Swaledale more closely. For previous reports on this see *The Naturalist*, 1936, pp. 177-178, and the Report of the Whitsuntide meeting at Keld (*Nat.*, 1937).

The chief new points noted were as follows:

(1) More juniper was found. Besides the larger areas on Kisdon Fell, near Thwaite, and on Harkerside Moor, odd bushes were noted on the cliffs above Kisdon Foss, at Muker, and in Gunnerside Gill and a side gill from it. The occasional bushes near Bridge End, West Stonesdale, and in Whitsundale were noted in the Keld report. A picture is thus obtained of Upper Swaledale as a district in which juniper is pretty frequently and widely scattered.

(2) Nevertheless the general impression that the juniper is on the down-grade was confirmed on this visit. The testimony of two or three local farmers agreed that an area of juniper in East Gill had disappeared altogether within their memory and the usual signs of degeneration which have been so often detailed, *e.g.* absence of young plants, were clearly noted over the whole area.

It is important to record, however, that the tenant of the field on Kisdon Foss containing the largest area of juniper could not agree that it was degenerating. He said that dying and dead bushes in this field were due to deliberate burning and that burning had not been continued because it only led to the invasion of bracken, a plant equally useless. He stated further that the people of Thwaite take yearly a considerable toll of juniper branches for firewood, and that in spite of this, in his judgment, there had been on the whole no degeneration in the 20-25 years he had known the field. This opinion is important, but it is still considered that the weight of the evidence drawn from the examination of juniper is against it. It may be noted that the two youngest plants found in his field were fifteen and seventeen years old respectively, so that there has been successful germination within the time this farmer has known the field.

(3) Two farmers agreed that in severe weather sheep eat the juniper, and stated that then the sheep have to be taken away from the field as the sharp leaves cause swollen sores on their lips, which take a long time to heal. The check to growth due to sheep is slight and much more damage is done by the rabbit. Of two neighbouring juniper areas separated by a wall and belonging to different tenants, the more flourishing one belonged to a farmer who said that he shot rabbits much more severely than his neighbour.

(4) The instance given above is one of several in which, as has been noted on Moughton also, a dividing wall makes considerable difference in the abundance or vigour of the juniper. Since the walls are man-made barriers and often separate areas of different treatment by tenants, the cause of the differences noted must be primarily human interference, acting in some cases through other biotic factors such as the rabbit or the sheep.

Botanical Records Committee (W. A. Sledge): The reports of the Union excursions which have appeared in *The Naturalist* show that all the areas visited during the past season have been botanically productive. This was particularly the case at Cawood and Pickering, and the finding of *Drosera anglica* Huds. on the latter excursion was a noteworthy addition to the few localities, all of long standing and of uncertain validity to-day, in which that species is known to occur in the county. The Cawood excursion produced many interesting species, and it is to be hoped that more excursions in future will be of the same type as regards breaking new ground.

WEST RIDING.—Mr. G. Taylor has found *Potamogeton praelongus* Wulf., and *P. nitens* Weber near Hatfield, the former new to V.C. 63. and the latter with but one previous record for this vice-county. *P. epiphydrus* Raf. var. *ramosus* (Peck) House was sent to me by Mr. H. Walsh from the Rochdale canal west of Hebden Bridge, a considerable westward extension of its range. In its original locality at Salterhebble, Halifax, it is now no longer to be found. Mr. Walsh also sent *Mentha gentilis* L., which he has found in three localities near Todmorden and Sowerby Bridge, *Hypericum dubium* Leers, and *Peucedanum palustre* Moench. The *Peucedanum* was found by the canal at Sowerby Bridge and at intervals down to Copley. It has evidently been here for a number of years, though the manner of its arrival is a mystery. I saw a few plants of the same species in its old station on the edge of Thorne Waste in August, but it is to be feared that its hold on this last native refuge in the county is now very precarious.

Mr. A. Malins Smith records *Calamagrostis lanceolata* Roth. from crevices in the limestone pavement at Malham, a great extension of its previously known area in the West Riding. He also notes that *Acorus Calamus* L. continues to flourish along the Leeds and Liverpool canal. In September I saw *Apera Spica-Venti* (L.) Beauv. for the first time in V.C. 64 in fields at Brayton, near Selby.

Mr. Wattam records the destruction at High Hoyland by agricultural operations of *Genista anglica* L., a rare plant in this part of the county. It is to be feared that *Orobanche reticulata* Wallr. will have suffered the same fate at Hook Moor as the area where it grew has now been ploughed.

NORTH RIDING.—In Teesdale *Polystichum Lonchitis* (L.) Roth. has been found by E. M. Payne on Cronkley Fell.

Mr. Malins Smith records *Epilobium alsinifolium* Vill. from the locality mentioned in Baker's *North Yorkshire* at Gunnerside Gill, and I saw the same species at Black Force, Howgill, in July.

Mr. E. R. Cross, Scarborough, says: The May lily has been found in another locality many miles from the recorded one, but it has probably been transplanted. *Cuscuta epithymum* (L.) Murr. has been found in profusion at Thornton Dale growing on marjoram, and *Orchis ustulata* L. has occurred in three localities, although only a few specimens at each. *Lycopodium clavatum* L. seems to have disappeared from our district. *Osmunda regalis* L. has gone from Forge Valley, and one specimen only has been found in another part of the district.

No records have been received from the East Riding.

Bryology (F. E. Milsom): Apart from the field meetings of the Union, field work in bryology has been necessarily restricted this year. The official meetings, though interesting—especially the Whit meeting at Ingleton—did not yield anything particularly new or startling,

although it was pleasant to see old friends in their accustomed habitats. Dealing with recorded work, easily the most outstanding piece of Yorkshire bryological literature for many years is Mr. W. H. Burrell's masterly survey of the present position of our knowledge on *Orthodontium gracile* and its variety *heterocarpum*. It is an additional pleasure to members of the Y.N.U. that a large proportion of the work detailed in the paper is the result of Mr. Burrell's own untiring and painstaking efforts over many years. The concluding sentence may be quoted here: 'Watson's variety "*heterocarpum*" appears to be a true breeding, very fertile, fixed mutation, that has established itself in Cheshire and the adjacent counties, during the past fifty years, and is still spreading.' Other interesting recorded work includes notes on a new locality for *Nowellia curvifolia* and on an abnormal growth of *Lunularia cruciata*.

Mycology (Miss J. Grainger): The end of September proved rather late for the Foray. War-time conditions did not enable many members to stay at headquarters, but day visitors from Barnsley and Huddersfield were able to join the party and a satisfactory amount of work was done. We were fortunate in having Mr. A. A. Pearson with us for the Saturday and Sunday, and his valuable help was much appreciated. It is possible that further records were obtained by him, but confirmation at the time of writing is not to hand, and any additions will be included in the next report.

Mr. Bramley is responsible for a very large number of the attached records.

During the year 'Historical Ecology of Fungi,' by Dr. Grainger, has appeared in *The Naturalist*. The writer continues his ecological studies, mainly in the Huddersfield district, and the herbarium at Ravensknowle grows by various additions.

Mr. John E. Barker has handed in a list of six vice-county records and one county record. It is encouraging to find this work quietly going on, despite the distractions of the times.

RECORDS—NEW TO BRITAIN

Puccinia pygmæa Erikss., II, III, on *Calamagrostis epigeios*, found by W. G. Bramley, Braham Park, October, 1940.

COUNTY RECORDS

Glonium mytilinum, V.C. 64.
Colletotrichum liliacearum (West) Duke, on bluebell stems.
Hymenochaete cinnamomsa (Pers.) Bres., on hazel in V.C. 62 and V.C. 64.
Inocybe descissa var. *auricoma* (Batch) Fr., V.C. 64 (det. A.A.P.).
Lycoperdon nigrescens Pers., V.C. 64.
Russula velenovskii (Melzer) Svara., V.C. 63 (det. A.A.P.).
R. grisea (Pers.) Bres., V.C. 64.
Valsa curreyi Nits., on larix, Aberford.

NEW TO V.C. 63

Hypocrea pulvinata Fckl.
Nitschkia tristis Pers.
Diatrype disciformis (Hoffm.) de Not.
Flammula gummosa (Lasch) Fr.
Psathyra gossypina (Bull.) Fr.
Trametes gibbosa (Pers.) Fr.
Merulius rufus (Pers.) Fr.
Peniophora setigera (Fr.) Bres.
Peziza venosa (Pers.).
Ophiobolus acuminatus (Sow) Duby, on old thistle stems.

FROM MR. J. E. BARKER, BARNSLEY

Boletus duriusculus Schulz.
Flammula ochrochlora Fr.
Fomes salicinus (Pers.) Fr.

Hypholoma cascum Fr.
Merulius pinastri (Fr.) Burt.
Stropharia inuncta Fr.

NEW TO V.C. 64

Lycoperdon nigrescens Pers.
Nectria punicea (K. & S.) Fr.
Valsa (Eutypella) sorbi, on mountain ash.
Anthostoma decipiens (D.C.) Nits., on elm.
Darlucula filum (Bivon.) Cast.
Curcubitararia laburni (Pers.) Ces. et de Not.
Diatrype flavo-virens.
Tricholoma leucocephalum Fr.
Russula atropurpurea var. *depallens* (Cke.) Maire.
Lactarius subdulcis var. *concausus* Fr.
Hygrophorus intermedius Pass.
H. spadiceus (Scop.) Fr.
Clitocybe expallens (Pers.) Fr.
Trametes gibbosa (Pers.) Fr.
Calocera stricta Fr.
Puccinia acetosa II, on *Rumex acetosa*.
Anthostoma turgidum (Pers.) Nits.
Cortinariarius (Myx) delibutus Fr.
C. (Tela) brunneus (Pers.) Fr.
Coprinus radicans (Desm.) Fr.
Lycoperdon pyriformi var. *excipuliforme* Desmaz.
Trichoscypha subtilissima (Cooke) Boud.

CONCHOLOGICAL SECTION

(Mrs. E. M. Morehouse).—On the whole very little work has been accomplished, nearly all members this year have had little leisure for the pursuit of outdoor pleasures owing to their various war-time activities in addition to their ordinary mode of life. Also the travelling facilities have and are becoming increasingly difficult. It is almost impossible to go far for a day or half day.

The outstanding report received is from Mr. Lowe, who was evacuated to Leyburn for a time, and who made an intensive search for mollusca over the area from Ulshaw Bridge, about three miles east of Leyburn, to Aysgarth Bridge; all the ground is situated on the north bank of the River Yore, including Leyburn, Spennithorne, Harmby, Wensley, Preston-under-Scar, Redmire, Castle Bolton, and Carperby. Nearly the whole of this area is composed of mountain limestone. Above the scars is found millstone grit, where molluscan fauna is negligible. Mr. Lowe not only includes a list, comprising 11 slugs, 31 land and 11 freshwater molluscs, but makes several valuable and interesting comments, such as '*H. hortensis* Müller is rare or non-existent above 800 ft., at that point *H. nemoralis* L., which is rare below 800 ft., seems to take charge. Along the Scarth Road *H. hortensis* Müller is common until the 800 ft. mark is reached, when it suddenly dies out and from that point *H. nemoralis* L. is abundant. In Bolton Gill, almost exactly on the 800 ft. line, *H. nemoralis* L. and *H. hortensis* Müller are found together; above are no *hortensis* Müller, below no *H. nemoralis* L.'

Mr. Lowe also remarks on not finding *Acicula lineata* Drap., which ought to occur, also *Pomatias elegans* Müller., *Acanthinula aculeata* Müller, *Caecilloides acicula* Müller, and *Theba cantiana* Montagu, all of which he was unable to find.

The foregoing survey was done in 1940 and received February, 1941.

On May 3rd, Mr. J. C. North, of Huddersfield, was the leader when the Yorkshire Conchological Society were at Reynard Ings,

Ilkley. Eleven species were taken, including *Azeca tridens* Pulteney, and *Vallonia pulchella* Müller, these are perhaps the most interesting.

On July 5th an excursion to Collingham, Linton, and Wetherby was made and fourteen species recorded. *Helicella itala* L. was not observed, but *Anodonta cygnaea* L. was. This time the leader was Mr. Rex Procter.

September 5th, the Yorkshire Conchological Society met at Wentbridge under the leadership of the writer. Fourteen species were recorded; it was noted quite a large proportion of the mollusca (including slugs) were very young, probably due to the dry spring and hot early summer, when they would be in summer hibernation. *H. hispida* L. and *C. bidentata* Strom. were the most dominant, the latter species abounded on the tree trunks as well as on old wood.

The lists of molluscs noted at Roche Abbey and Ingleton have already appeared in *The Naturalist*, but I would like to call attention again to the beautiful little *P. nautiluleus* L. = *P. crista* L. found on the starwort brought from the lake.

Mr. J. C. North has taken *Dreissensia polymorpha* Pallas and *Neretina fluviatilis* L. from the Skipton Canal, also *C. cravenensis* Taylor from, Settle; all these are worthy of note.

Mr. J. H. Lumb, Halifax, says: 'Most of the usual species have been noted in their usual habitats around Halifax. One of the best places for *L. stagnalis* L. has been spoiled owing to the Dyeing Co. having improved, from their point of view, the dam where this species occurred in large numbers. Concrete walls are not conducive to pond life of any description.

'*Paludetrina jenkinsi* Smith is extending its range around Halifax, having got to several small dams from the canal where it was first recorded.'

On September 20th I found *H. nemoralis* L. in a lane leading from Scaftworth, near Bawtry; it is a new habitat for it and I think is just within the Yorkshire boundary.

Caecilioides acicula Müller is still to be found in an old quarry near Stapleton Park.

Mr. L. Smith, Doncaster, found *Milax sowerbyi* Fér. in his garden; it was crawling up some cabbage. This slug is quite local in its range.

VERTEBRATE ZOOLOGY SECTION

MAMMALS REPTILES, AMPHIBIANS, AND FISHES

Mammalia (Mrs. A. Hazelwood).—It is reported that Moles were very plentiful in most parts of the Scarborough district, especially between Scarborough and Pickering, and at Highdale near Hackness. Around York Moles suffered very much in the dry months of the spring and early summer, and Mr. Taylor saw many dead and much surface tunnelling in the dry earth. Four Water Shrews (*M. fodiens bicolor*) were seen together in a ditch near Scalby in early June. While cycling between Glusburn and Keighley over a period extending from Easter week until September 16th, Mr. Butterfield saw twelve Hedgehogs (*E. europæus*) which had been killed by vehicles. Eleven of these were from 8 to 10 inches in length, the twelfth seen on September 16th was but 5 inches long; three of these Hedgehogs were within the Keighley Borough boundary where it adjoins the Steeton township, six were seen in the Steeton township within half a mile of the Keighley boundary, and three were seen in the Eastburn section of the road (ten were killed on this stretch of road). There has been a big increase in the number of Hedgehogs in the York district.

Mr. Longbottom, of the Keighley Museum, passes on the following information re Whiskered Bat (*M. mystacinus*) which is interesting, but cannot definitely be claimed as a record owing to the time that has elapsed, incomplete data, and no means now available for checking it.

In the School Loan Collection of that Museum there is a stuffed specimen of the Whiskered Bat wrongly identified and labelled Common Bat 'Caught in Victoria Park, Keighley, 1908.' This has been in the case for years, but is undoubtedly a young male Whiskered Bat. As this was in the late S. L. Mosley's time of curatorship, Mr. Longbottom looked up his records for the Pipistrelle, but unfortunately he does not record one from Victoria Park. After recording several, he presumably left off, as this is the commonest local species. With this exception, the Whiskered Bat has not been recorded for Keighley, and therefore the above is considered worthy of mention. Probably many small species of Bats were wrongly identified in the past. There is a colony of Noctule Bats near York, and Mr. Taylor records them hawking over the Ouse, north of York, in the gloaming.

A bitch Fox (*V. vulpes crucigera*) weighing 24 lbs. was shot at Steeton near Keighley on July 2nd, 1941. A dog Fox and four cubs were also shot in the same district earlier this year. (During last year four immature Foxes were shot in the Steeton district.)

Badgers (*M. meles meles*) are reported very plentiful in the Dales north of Helmsley. One was killed at Aldby Park near York on May 13th. Two fully-grown examples were seen in broad daylight at the edge of Raincliffe Wood near Scarborough on May 14th. On July 13th Mr. Barnes was walking up Haugh Howe valley near Pickering early in the morning when he noticed a movement in the undergrowth by the side of the path, and found the commotion to have been caused by a fully grown Badger which beat a hasty retreat. (A Badger now preserved in the City Museum, Sheffield, is stated to have been run over by a motor car in Chesterfield Road (skirting Graves Park), Sheffield, on February 13th, 1939. This has not been previously noted in *The Naturalist*.) Mr. Barnes sends me the following note which I include in full. When cycling from York to Ampleforth on July 19th, Mr. Barnes had just descended a steep hill and crossed the railway about a mile from Ampleforth village when a Weasel, carrying what appeared to be a large mouse, struggled across the road. He shouted, and the Weasel dropped its prey before making for the thick grass on the roadside. He dismounted, and picking up the prey which proved to be a full-grown Bank Vole, began to examine it. The Vole was quite dead, having been dispatched by a bite at the base of the skull. Whilst examining the Vole Mr. Barnes became conscious of a movement in the grass. On seeing that he was watching, the Weasel immediately disappeared, only to reappear some little way off to watch again. This game of hide and seek went on for some little time, until it became evident the Weasel was not going to relinquish its meal in a hurry. To test the Weasel's pluck still further, Mr. Barnes placed the Vole about a yard away from the grass verge, and then retired a few yards. After much running about amongst the grass, and several attempted rallies which ended in precipitate retreat, the Weasel finally reached its prey, took it by the neck, and dragged it to the cover of the grass. A considerable increase in the number of Stoats (*M. erminea stabilis*) around York is recorded.

On August 23rd, when sheltering from a heavy downpour of rain near Bessingby, Bridlington, Mr. Ainsworth noticed a Stoat moving young ones from a ditch to a nearby cornfield. Each young was carried in the same manner as a cat carries her kittens. Having heard that a Stoat is very fierce in defence of her youngsters, Mr. Ainsworth decided to test the theory. He ran after the Stoat, which dropped the young one and scurried into the ditch. He picked up the young Stoat, which was half grown and quite capable of running. The mother did not return, so he eventually put the young one down and it quickly disappeared among the grass.

A Common Seal (*P. vitulina*) visited Scarborough Harbour on several occasions during April and May.

The following note appeared in *The Northern Echo*, December 20th, 1940, which seems worthy of record in full. 'The presence of Seals in the non-tidal part of the Esk has rarely been recorded. One was seen above the dam at Ruswarp, near Whitby, a day or two ago. People saw it, and so did a big dog Otter. When walking along the roadway adjoining the river, several people were startled to hear a commotion in the water near the ruins of Chain Bridge. A terrific thrashing of the surface was taking place, and it was soon seen that a large Seal and a dog Otter were engaged in battle. The Seal sent out piercing screams and seemed to be unable to seize its opponent. The Otter had gripped it behind one of its fore-flippers and it could not bend sufficiently far back to get its teeth into the Otter. The encounter lasted for about 15 minutes. During this time the Seal several times lifted the Otter right out of the water as it turned and twisted to shake itself free. Eventually the Seal shook its opponent off and made down stream as quickly as possible. It is thought that it was attracted to the place where the fight occurred by the presence of large numbers of Salmon and Sea Trout, which are now making their way from the sea to the spawning beds on the higher part of the river.'

The food position is automatically reducing Rabbits in many rural districts, probably Hares too. With Foxes, it will work the other way, unless they are shot. Rabbits are very scarce all over the York district. The does are carrying young very late this year. Hares (*L. europæus occidentalis*) were so scarce on the Wolds this year that the usual annual coursing meeting had to be abandoned. In the Hull district, like elsewhere, Rabbits have been decimated to the needs of the times; Hares, however, are abundant, and the small rodents have been much in evidence.

A small colony of Water Voles (*A. amphibius amphibius*) have established themselves at the Scarborough Mere. Mr. Greaves suggests that in his opinion Water Voles have been distinctly less numerous near Halifax since last winter. Common Field Voles (*M. agrestis hirtus*) which were scarce during 1936-39 around Egton Bridge have increased steadily during the last two years, and in places threaten to become a plague.

A single Red Squirrel (*S. vulgaris leucourus*) was seen at Highdale, near Scarborough, on April 13th. Four or five Red Squirrels were observed in different parts of the wooded valleys of the Doe Beck and Twis Beck. One pair were building a drey of twigs, branches and leaves in mid-July, and beside a footpath. One Grey Squirrel (*S. carolinensis*) was observed in a shrubbery near Harrogate Stray. This creature was heavily marked with reddish brown, but Mr. Nicholas says it was clearly a Grey. The Grey Squirrels liberated in Hebden Valley near Hebden Bridge shortly after the end of the last war have now about 'worked themselves out.' Grey Squirrels are also reported from Hook Moor. Both Red and Grey Squirrels are very scarce in the Egton district this year. The Greys should have increased as there are now no gamekeepers to shoot them.

The catchwater drain on the way to White Holme reservoir, Blackstone Edge (on Langfield Moor) is again revealing a crop of mammalian accidents. Only three species are represented up to date—Field Vole, Common Shrew, and Wood Mouse.

At Holmfirth, near Huddersfield, a family consisting of two daughters and their parents (a troupe of acrobats), whilst touring in Sumatra two years ago were presented with a tiger cub. Now they are at home, and the tigress is taken out for exercise on a slender lead by her mistress. The children caress the big cat like a dog. The Urban District Council held a special meeting to decide what to do about a pet tigress taking the air in the main street, when it was decided to hand over the case to the Police for their consideration.

Reptilia (Mrs. A. Hazelwood) : A European Pond Tortoise measuring

8 inches in length was caught by an angler in the Scarborough Mere during the first week in August. This had no doubt been kept as a pet and turned into the lake as the species does not now occur in this country in a wild state.

I have a note on the occurrence of Viviparous Lizard (*L. vivipara*) on Ickornshaw Moor, Cowling, Pinhaw, near Lothersdale, Farnhill Moor, and Keighley Moor.

The Viper or Adder (*V. berus berus*) was first seen out in N.E. Yorkshire on April 27th. Many perished during the great moorland fires of the early part of the year; where the fire has not swept they have been fairly abundant. A specimen 18-20 inches in length was killed in Avenue Road, Scarborough, on August 17th. On July 19th a very dark specimen of the Viper was caught between York and Ampleforth; it is reported that this Adder was 'so dark that the dorsal markings were almost entirely merged with the general ground colour.' Without having seen the specimen referred to it is difficult to express a definite opinion, but the following observation may be of interest. In the male Adder melanism is produced by an extension of the black markings which invade the whole surface; in the female there is a general darkening of the ground colour and of the markings, but under certain lights or after a prolonged sojourn in spirits these markings reappear. Melanism is quite frequent in snakes, and sometimes affects all individuals in the same locality.

Grass Snakes (*Natrix natrix*) have been comparatively abundant in Holderness this year.

Amphibia (Mrs. A. Hazelwood).—Both the Smooth Newt (*T. vulgaris vulgaris*) and Crested Newt (*T. palustris palustris*) occur commonly around Leeds. See note in *The Naturalist*, p. 77, April, 1941, on total neotomy in *T. v. vulgaris*.

An absence of Frogs (*R. temporaria temporaria*) from Emroyd Wood, Middletown, is reported, the first time for many years. On May 11th a number of young Frogs 1-1½ in. in length were in Mr. Smith's garden at York. It is suggested that these were late hatched young of last year, which have survived the hard winter. Around Leeds the species has been as common and widespread as usual. There were a number of large and partly metamorphosed tadpoles very early in the year. These were evidently tadpoles which had wintered in a state of partial neotomy, a condition which is probably due largely to the very severe winter (see *The Naturalist*, p. 79, April 1st, 1941). Some of these were kept by Mr. Procter, some in congenial and some in uncongenial conditions. The former completed the metamorphosis in the normal manner, the latter made no attempt to complete the metamorphosis. In some of the latter the hind legs were fully developed and the 'buds' of the forelegs were evident, although the tail was still large and powerful. Mr. Procter suggests that once metamorphosis has been suspended it needs some impulse to restart the mechanism, and that it will not recommence in unfavourable conditions. A number of red coloured Frogs occurred in Mr. Procter's garden; their surface markings were very clear and distinct.

Common Toads (*B. bufo bufo*) have been more common than usual around Leeds, and there have been numbers of exceptionally large specimens, including one exhibited by Mr. Firth which was the largest Toad ever seen by Mr. Procter.

Pisces (Mrs. A. Hazelwood).—On July 19th Sea Lampreys (*P. marinus*) 2-3 feet long, blue-black in colour with grey mottlings, were seen in the tidal water of the River Wharfe at Tadcaster, and several averaging 2 lbs. in weight were taken by a Mr. A. Statler, of Tadcaster; they were very strong and able to lift quite large stones. On May 12th, numbers of young Lampreys about 5 ins. long were seen in the River Rye at Helmsley; they are usually seen there in June and July.

A small example of Sturgeon (*A. sturio*) weighing 21½ lbs. when gutted, was caught near Scarborough by s.t. *Persian Empire* on March 13th, and sold for £4 10s. 0d.

An unusually large specimen of Cod (*G. callarias*) was caught on hook and line at Scarborough on March 4th by the motor boat *Nellie*. It weighed exactly 56 lbs., was 47 inches in length, and contained a roe weighing 4 lbs. It was sold for £2 6s. 0d. From the examination of single vertebra its age appeared to be approximately 25 years.

Flounders (*P. flesus*) have been caught around York in the Ouse, Derwent, Nidd, and Wharfe, some 1 lb. weight.

All kinds of fish have become much more plentiful owing to the virtual cessation of trawling during the war period. Small cobbles with crews of two men are making from £40-£70 per day. The *Acuba*, a larger type of boat, landed a catch taken in ten hours which sold for £1,000 on the Scarborough Fish Market.

The above report is considerably reduced this year as many of our observers are now serving with the Forces, or working much longer hours than normal. And, in addition, we now deeply regret the loss of Mr. H. B. Booth, a model of careful observation and accurate recording, and the founder of the Vertebrate Section who was for many years its Secretary—a loss we cannot make good. Mr. Booth's contribution was always a welcome addition to these annual reports. In conclusion, I would like to thank Messrs. C. F. Procter (Hull), R. Procter (Leeds), S. H. Smith (York), R. Chislett (Rotherham), F. H. Edmondson (Keighley), W. J. Clarke (Scarborough), M. Longbottom (Keighley Museum), S. E. Evans (Doncaster), E. W. Taylor (York), W. W. Nicholas (Harrogate), W. Greaves (Halifax), M. Barnes (Huddersfield), G. H. Ainsworth, A. Butterfield (Cross Hills Naturalists' Society), W. Pickles (Leeds), E. Lee (Doncaster Scientific Society) and Miss Downend (Sorby Natural History Society) who, by their co-operation, have made possible this report.

ORNITHOLOGY

(Ralph Chislett).—It is meet that first we should briefly refer to the irreparable loss Yorkshire ornithology has sustained by the death of the late H. B. Booth. The loss is personal to each of us, for to every genuine seeker after ornithological truth in Yorkshire he was a friend. For long he had been a wise mentor and friend to myself. Equally is the loss collective, for H. B. Booth had been our leader for many years. By the exercise of his own transparent good humour he was able to question records, and to elicit needed data concerning records sent to him without causing annoyance, a quality that added immensely to the value of his work as Recorder for the West Riding. More than most he combined scientific research with a love of birds that was always obvious when he spoke. To H.B.B. we all of us owe a good deal, and we owe to his memory the attempt to continue the high standard of detailed exactitude that he always maintained, and to give to his successor as West Riding Recorder all the assistance upon which H.B.B. could count and would wish to be continued.

From the North Riding comes news of the much regretted death of the late F. Snowden, of Whitby, whose notes have for many years appeared in the reports of W. J. Clarke.

As against these sad losses I can report that I am still getting into touch with ornithologists in Yorkshire who have not hitherto been associated with our work.

Reprints of the 1940 Report were duly supplied to contributors and to others to whom it was likely to be useful. Some copies are still available. It met with approval, and a suggestion from W. B. Alexander, of the Edward Grey Institute of Field Ornithology, that in future the records of each species should be assembled together, the Ridings being indicated by a letter.

DONCASTER CORPORATION WATERWORKS—THRYBERGH FISHING.
FISHING STATISTICS.

Month.	1936		1937		1938		1939		1940		1941	
	No. of Anglers	No. of Fish Caught	No. of Anglers	No. of Fish Caught	No. of Anglers	No. of Fish Caught	No. of Anglers	No. of Fish Caught	No. of Anglers	No. of Fish Caught	No. of Anglers	No. of Fish Caught
April ...	137	21	193	27	127	12	58	26	177	69	123	41
May ...	311	37	167	12	105	6	185	23	189	49	110	9
June ...	278	131	304	83	186	80	189	206	210	145	284	195
July ...	189	88	219	36	168	35	203	162	228	193	248	62
August ...	210	93	130	22	96	38	164	139	161	68	205	102
Sept. 1st—												
Oct. 1st...	127	41	145	51	120	97	59	25	112	68	125	32
Totals	1261	411	1158	231	802	268	858	581	1077	592	1095	441
<p style="text-align: center;">As compared with Season</p> <p>1926 1927 1928 1929 1930 1931 1932 1933 1934 1935</p> <p>Do. do. do. do. do. do. do. do. do.</p> <p>Do. do. do. do. do. do. do. do. do.</p> <p>Do. do. do. do. do. do. do. do. do.</p> <p>Do. do. do. do. do. do. do. do. do.</p> <p>Do. do. do. do. do. do. do. do. do.</p> <p>Do. do. do. do. do. do. do. do. do.</p> <p>Do. do. do. do. do. do. do. do. do.</p>												

WATER ENGINEER'S OFFICE,
DONCASTER,

October 4th, 1941.

N.B.—There was a very big hatch of Mayfly in June which lasted for nearly three weeks, and this accounts for the greater number of fish taken in that month. Fish under 12 inches are put back and not recorded.

Field work in 1941 has been restricted, but I can say that detailed reports much less inadequate than might be expected will be forthcoming for the February meeting of the Vertebrate Section. More attention has had to be given to our home districts. The Halifax reservoirs, and other waters elsewhere, have been visited, and some interesting records made. Other good records will come from some who are engaged in war work, militarily and otherwise, largely in the open air in Yorkshire, and who have systematically made notes. No doubt coastal areas will have been neglected. The Yorkshire Naturalists' Union field meetings were profitably attended. Photographers of birds in Yorkshire have managed to get a little interesting work done.

Although Alfred Hazelwood is now in the Navy, Mrs. Hazelwood is anxious that his work shall not cease, and she will attend to any birds found dead that are sent to her at 54 Somerset Road, Bolton, and make skins of any that should be preserved. R. Wagstaffe, of the York Museum (vice Dr. Collinge), whom we are very glad to welcome amongst us, offers the use of the York collections to our members.

In spite of the cold of early spring, a long fine spell lasted until midsummer and meant a good nesting season for most species. Early in the spring evidence became plain of the partial recovery in numbers of most of the species that became so badly reduced in 1940. The cold weather of early 1941 was not nearly so disastrous to birds as that of the previous year: temperatures were not so low. Reports from the coast in this connection will be interesting if available.

Moorland birds generally had a fair breeding season. Notes on the prevalence of Ring Ouzels in all Yorkshire habitats would be welcome. The species was well distributed about Ingleborough at Whitsuntide, but is possibly decreasing in some areas. I should also be glad to receive notes on the present status in Yorkshire of the Nightjar and Red-backed Shrike. A note on the occurrence of the latter species near Hull in June 1941 comes from G. H. Ainsworth.

A new field of enquiry, into the methods of sanitation of nesting birds, has been instituted by the British Trust for Ornithology. Our Committee is now affiliated to the B.T.O., and it is hoped that Yorkshire will take its share in this and other investigations. In the assembled records recently published in *British Birds*, some of which came from Yorkshire, the incomplete character of many is noticeable, records often only dealing with one stage of the growth of the young, although sanitary practices may and do vary with growth. Forms giving the complete information desired can be obtained from the E.G.I. of Field Ornithology, 39 Museum Road, Oxford.

Opportunities for ringing species of the movements of which little is known were curtailed like other field work, but the specimens I was able to ring included four young Montagu's Harriers in Yorkshire.

For the time being I have agreed to act as West Riding Recorder. Will those who hitherto have sent their notes to the late H. B. Booth kindly send their notes for 1941 to me. The detailed reports will again extend to December 31st, and be read at the February meeting of the Vertebrate Section for publication in the April *Naturalist*. Reprints will again be available.

Wild Birds and Eggs Protection Acts Sub-Committee (C. F. Procter and R. Chislett): There is little useful work that can be done under present circumstances, but our influence will continue to be quietly used. An appeal for funds was not issued.

There is no report of a Stone Curlew having been seen in 1941.

A pair of Montagu's Harriers laid and hatched eggs, and when last seen in the nest the young were some four weeks old. At least one young bird was afterwards seen on the wing.

In the East Riding birds persist in spite of the militarisation of the coastal area. Little Terns and Ringed Plovers were normal in numbers.

The colony of Terns that has existed for some years on the point at Spurn transferred to a site used formerly. Hornsea Mere remains unchanged as far as birds are concerned. No notes have been received from Bempton or Flamborough Cliffs.

Mr. F. H. Edmondson has been elected Chairman in place of the late Mr. H. B. Booth.

ENTOMOLOGICAL SECTION

Coleoptera (W. J. Fordham) : Considering the times a fair amount of work has been done in the order. Three species new to the county have been taken viz., *Scymnus hæmorrhoidalis* Hbst., Skipwith Common, W. D. Hincks; *Cæliodes erythroleucus* Gyll., Buttercrambe Woods, M. D. Barnes; and *Anisandrus dispar* F., Barnsley, E. G. Bayford. A full account will appear later in *The Naturalist*.

Diptera (Chris. A. Cheetham) : Diptera have not been plentiful this year, although on a few occasions, notably at Pickering in August, the troublesome woodland fly, *Hydrotæa irritans* (the sweat fly of the Americans) was far too plentiful, but on the hot day at Aberford on June 21st it was absent; local members remarked on this for normally it is a troublesome pest in these woods. The dry hot weather appeared to be a deterrent to emergence from the pupæ. At Roche Abbey an addition was made to our list, an Ephyrid, *Pelina ænea* Hal. The most noticeable species were the large *Bibio Marci* L. and the small sandfly, *Simulium ornatum* Mg. At Ingleton again it was a Bibionid, *Bibio leucopterus* Mg., that caught the eye; *Tipula hortulana* Mg. was plentiful, and the best capture was *Tipula truncorum* Mg.

Amongst the few flies caught at Aberford a large Tachinid, *Echinomyia fera* L., was the best, and, strangely, this species, first added to our list last year, was caught on Austwick Moss on September 13th. At Cawood *Volucella pellucens* L. was plentiful and a few *Sicus ferrugineus* L. were seen, and here *Tipula peliostigma* Schum. was added to our list. At Pickering a notable addition was the Tachinid, *Allophora hemiptera* F., and here *Conops flavipes* L. was seen occasionally. On a visit to Whernside on August 5th the uncommon *Amalopsis occulta* Mg. was caught, and small swarms of a Phorid, *Trineura velutina*, attracted attention in many sheltered corners. A correspondent, Mr. Frank Hewson, from Shipley, sent specimens of a Tachinid which he had bred from the cocoon of a Garden Tiger Moth (*caja*). This seems to be *Carcelia comata* Rond in Wainwright's paper on British Tachinids (*Trans. Ent. Soc. Lond.*, 1928, p. 181).

Hemiptera (J. M. Brown) : As was the case last season, all my own collecting has been carried out in the immediate neighbourhood of Robin Hood's Bay. The season this year has not been a particularly good one, many species usually seen have not been noticed, while many others matured later than usual. The lists that follow give the most interesting of my captures, the dates assigned being the earliest on which I collected the species, and the arrangement is in accordance with these dates.

HEMIPTERA-HETEROPTERA

- Piezodorus lituratus* F. 2/5, on gorse on Ness Cliffs.
Acanthosoma hæmorrhoidale L. 24/6, and again 10/10, with immature individuals in between, on hawthorn.
Capsus ater L. 24/6, by roadsides.
Calocoris ochromelas Gmel. 24/6, on oak.
Trapezonotus arenarius L., 27/6, in garden.
Calocoris sexguttatus F., 20/7, on nettles, etc.
Phytocoris ulmi L., 2/7, on tree trunks.
Pentatoma rufipes L., 21/7, on palings, etc., and immature individuals on oak.
Heterotoma meriopterum Scop., 2/8, by roadsides and in garden.

Myrmus miriformis Fall., 6/8, among rough grass and rushes.
Dicyphus pallidicornis Fieb., 27/8, on foxglove in garden.
Phytocoris populi L., 3/7, about hedges. New to V.C. 62.
Orithotylus nassatus F., 9/9, on palings, again at Fylinghall.
Temnostethus pusillus H.S., 9/9, on oak trunks.
Microphysa elegantula Baer., 9/9, with the last.
Pantilius tunicatus F., 10/10, on hazel, and nymphs, 17/9.

HEMIPTERA-HOMOPTERA

Criomorphus affinis Fieb., 4/6, on oak.
C. albomarginatus Curt., 4/6, among grass.
Sowronius (Cicadula) dahlbomi Zett., 21/7, on bracken, again at Brockets.
Idiocerus lituratus Fall., 4/9, on sallow.
Tettigonia viridis L., 9/9, among damp vegetation.
Typhlocyba geometrica Schr., 17/9, on alder.
T. quercus Fab., 17/9, on oak and hawthorn.
Erythroneura alneti Dahl., 10/10, very plentiful on alder.

NEUROPTERA (LACEWINGS)

Chrysopa carnea Steph., 7/1, hibernating ; 27/6 and 9/9, in the open.
C. ciliata Wesm., 28/6 and 11/9.
Semidalis aleurodiformis Steph., 28/6.
Chrysopa ventralis f. *prasina* Burm., 1/7.
Hemerobius stigma Steph., 4/7.
Wesmaelius concinnus Steph., 4/7.
Chrysopa flava Scop., 5/7, in garden.
Hemerobius micans Oliv., 21/7.
H. lutescens Fabr., 28/7.

PSOCOPTERA

Peripsocus alboguttatus Dahl., taken on larch, 26/9/41, is an addition to V.C. 62. It has previously been recorded only from the Sheffield district, V.C. 63. (*Naturalist*, 1937, p. 254.)
Lachesilla pedicularia L., occurred on sycamore trunk, 29/8, and again in plenty on larch, 20/9 and 3/10.

PLECOPTERA

My first captures of stoneflies appear to be rather earlier than for the corresponding species last year.

Capnia nigra Pict., 1/2 and 6/2 by Brockets Beck.
Protonemura precox Mort., 21/3, Brockets and Fylinghall.
Leuctra hippopus Kmpy., 12/4, Howdale.
Capnia vidua Klp., 12/4, by Howdale Beck.
Tæniopteryx risi Mort., 8/4, Ramsdale Beck.
Nemoura cambrica Steph., 25/4, Brockets.
N. erratica Cl., 26/4, on Ness Cliffs.
Perlodes mortoni Klap., 29/4, Brockets.
Chloroperla torrentium Pict., 3/6, Brockets.
C. tripunctata Scop., 3/6, with the last.
Leuctra inermis Kmpy., 3/6, Brockets.
Nemoura standfussi Ris., 23/6, again in Linger's Fields.
Leuctra moselyi Mort., 29/8, Fylinghall, and 9/9, Howdale.

TRICHOPTERA

I have seen comparatively few caddis-flies during the season, but the following have been taken :

Limnophilus griseus L., 4/6, by Ramsdale Beck.
L. luridus Curt., 7/6, Ramsdale.
L. sparsus Curt., 23/6, Linger's Fields.
Hydropsyche instabilis Curt., 24/6, Brockets.
Bæa pullata Curt., 30/6, at Maw Wyke, an addition to V.C. 62.
B. maurus Curt., 30/6, also at Maw Wyke.
Odontocerum albicorne Scop., 21/7, by Brockets Beck.
Silo pallipes Fabr., 28/7, Brockets.
Agapetus fuscipes Curt., 9/8, Ness Cliffs.

Limnophilus auricula Curt., 18/8, Brockets.

Stenophylax latipennis Curt., 4/9, Linger's Fields, and 11/9, Brockets.

Rhyacophila dorsalis Curt., 11/9, Brockets.

ORTHOPTERA

Earwigs and grasshoppers were extremely plentiful during September and early October, but only the same common species, as previously listed, were seen.

Lepidoptera : Once more the activities of lepidopterists have been curtailed, but the Union held meetings at Ingleton, Aberford, Cawood, Pickering, and Roche Abbey, and reports on these have appeared in *The Naturalist*. In an endeavour to save space these records are set out in note form.

Material has been submitted by the following : Miss M. E. Ackerley (Mitton), and Messrs. M. D. Barnes (Marsh, Huddersfield), E. G. Bayford (Barnsley), W. G. Bramley (Bolton Percy, York), W. Buckley (Skelmanthorpe), C. A. Cheetham (Austwick), J. Hooper (Horbury and Wakefield), M. Longbottom (Keighley), R. Procter (Beeston, Leeds), W. Ainley and H. Spencer (Elland), A. Smith (York), and W. E. L. Wattam (Newsome, Huddersfield).

Mr. Cheetham states that the immigrants have apparently almost forsaken the Grange Coast this year in favour of the Yorkshire area.

A noteworthy feature has been the influx of imagines of the Clouded Yellow, *Colias edusa* Fabr., which has been noted from many parts of the county. The occurrences were Mewith (Bentham) and Skibeden (Skipton), June 24th ; towards Draughton (Skipton), July 1st ; Riddlesden, July 4th ; Bradley (Keighley), July 6th ; Cawood, July 12th ; Marsh (Huddersfield), July 20th ; York, August 23rd, September 1st and 2nd (all males). Between Wakefield and Horbury, August 24th ; Elland, 5 males, August 24th, 2 males and 1 female August 31st, 1 male September 1st, several September 7th, and 3 September 9th ; Bolton Percy, 1 newly emerged September 4th ; Hackness, September 4th ; and Mitton, September 6th. At Elland several imagines were observed and taken in fresh condition tending to support the view that this insect had bred locally. The three seen on September 9th were close to a clover field and it is supposed that breeding had occurred there.

V. cardui (L.). Mitton, July 9th (1) ; Elland, 2 larvæ on thistles and several imagines during last week August and first week September ; York, more plentiful than recently, attracted by dandelions ; Bolton Percy (several during June).

V. io (L.). Mitton (1) ; Elland (2 or 3 only).

V. atlanta (L.). Mitton (unusually numerous) ; Newsome (not uncommon) ; Deffer Wood, October 4th (1 seen), none in Barnsley area before this ; Wakefield (very common) ; Keighley (none seen) ; Elland (several larvæ in August later than usual ; last imago, Cromwell Wood, October 11th).

V. urticae (L.). Skelmanthorpe (more than usually common during early July) ; Newsome (abundant, especially during September) ; Barnsley (more in evidence than in recent years) ; Keighley (not so plentiful as usual) ; Elland (abundant and was flying commonly during August and first fortnight September, but no late larvæ on nettles this season).

C. phlaeas (L.). Barnsley (well in evidence, perhaps not so common as last year) ; Newsome (abundant, especially during September) ; Wakefield (very common) ; Elland (August brood more abundant than usual) ; Keighley (only few seen).

E. cardamines (L.). Skelmanthorpe (frequent) ; Bolton Percy (fairly abundant).

P. brassicae (L.). Newsome (considerable numbers despite cold dry spell in early spring ; in reduced numbers in second brood) ; Skelmanthorpe (more than usually common) ; Wakefield (swarms) ; Keighley

- (normal numbers); Elland (summer brood did not emerge until last week in August and was scarce); Bolton Percy (rather scarce).
- P. rapæ* (L.). Newsome (first brood considerable, second in reduced numbers); Keighley (normal); Elland (not very common); Mitton (appears to increase annually).
- P. napi* (L.). Elland (summer brood not very common).
- C. pamphilus* (L.). Keighley (normal numbers); Elland (1 only seen); Copley (seen near Copley Church).
- E. janira* (L.). Elland (1 July 20th; this species is not usually seen in the district).
- A. paphia* (L.). Emley Park (July 14th).
- G. rhamni* (L.). Seen at Strensall, June 1st; York, September 10th; Stamford Bridge in early June. Was also taken by P. J. McHugh at York on May 30th and Strensall on April 25th.
- A. aglaia* (L.). Plentiful at Buttercrambe, first on July 12th, about 20 taken. Still on the wing on August 31st.
- P. megæra* (L.). Taken by P.J.M. at York on June 22nd and two specimens at Kexley on August 27th; Bolton Percy (1 June 23rd).
- O. citrargo* (L.). Skelmanthorpe (larvæ very common in early June; imagines at end August); Leeds, Temple Newsam (larvæ on lime).
- H. leucophæaria* (Schiff.). Skelmanthorpe (imagines to be seen generally in district January 11th; more than usually common in Deffer Wood, melanic var. rapidly spreading to all parts of the district).
- A. pædaria* (F.). Skelmanthorpe (well out throughout area January 11th); Elland (common).
- Z. filipendulæ* (L.). Keighley (2 imagines seen in only area known in district July 4th).
- M. stellatarum* (L.). Marsh (June 22nd, one).
- D. elpenor* (L.). Barnsley (very much on increase; both imagines and larvæ seen); Elland (one); Birkby, Huddersfield (several); Beeston (1, July 4th).
- N. dromedarius* (L.). Elland (4 seen).
- O. camolina* (L.). Elland (1 larva on hawthorn; previously taken on birch and lime in the district); Beeston (larvæ).
- D. dictæoides* (Esp.). Elland (2 larvæ seen).
- P. gamma* (L.). Elland (migrants swarmed, but few later in autumn); Beeston (very common this year).
- P. festucae* (L.). Elland (some taken July 12th and 13th); Buttercrambe (June 6th, not so plentiful as 1940).
- P. moneta* (L.). Beeston (1 at flowers, July).
- P. chrysitis* (L.). Elland (less common than 1940); Beeston (very common at flowers, July).
- P. lota* (L.).
- A. leporina* (L.). Elland (2 larvæ taken); Beeston (2 larvæ on poplar, August 11th).
- Z. pyrina* (L.). Heworth, York (1 male, July 3rd, 1 female on each of July 20th and 26th).
- T. cratægi* (L.). Sandburn (May, larvæ plentiful on apple trees; imagines from August 24th to 26th).
- A.alni* (L.). Buttercrambe (1 larva on birch, July 24th, fully fed); Newton Dale (1 larva on alder, August 20th).
- C. xerampelina* (Hubn.). York (1 larva, June 6th).
- H. glauca* (Hubn.). Strensall (1 freshly emerged female found at rest June 6th).
- R. sericealis* (Scop.). Buttercrambe (August 23rd very plentiful).
- A. immutata* (L.). Buttercrambe (August 23rd fairly plentiful).
- E. pygmeata* (Hubn.). York (in good numbers on railway embankment from June 1st till late in month); Strensall (1 specimen June 11th); Askham Bog (several June 9th).
- E. pusillata* (Fabr.). Occurred at Sand Hutton and Strensall in early

June. This insect, only recently recorded for Yorkshire, seems to have spread all over the district. (A. Smith.)

C. nupta (L.). One taken at rest on telegraph pole near York, September 24th. (P.J.M.)

E. parallelaria (Schiff.) is still to be found in its old haunts, from nine larvæ obtained I managed to get eight into pupæ, and these emerged during second and third week of August, rather later than usual. (A. Smith.)

Evetria posticana (Zett.). This capture is probably the best record as this species has not, so far as I know, been recorded for Yorkshire previously. The solitary specimen was beaten out of the hedgerow on the edge of Strensall Common, further searching producing no more. (A. Smith.)

The following were taken at Beeston, Leeds :

C. glaucata Scop. Common in May.

H. prasinana (L.). One larva, Temple Newsam, September 27th.

T. jacobææ (L.). One imago, June 14th.

A. megacephala (Fabr.). Larvæ very common on poplar.

A. psi (L.). Common.

A. tipuliformis Clerck. W. D. Hincks in his garden this summer.

P. chi (L.). very common on walls in August.

P. chi vars. *olivacea* and *suffusa*. Plentiful.

P. aprilina (L.). Temple Newsam, September 27th.

E. lucipara (L.). One in July.

H. silaceata (Hubn.). Plentiful at Temple Newsam.

C. coronata (Hubn.). One taken at Temple Newsam, July 4th, by R. Procter ; a record for V.C. 63 is by B. Morley, Walton Hall Park, June 15th, 1918.

[The Nomenclature of the insects mentioned above is that of C.

Meyrick, 1927.]

INCOME & EXPENDITURE ACCOUNT

Year ending November 22, 1941.

INCOME.			EXPENDITURE.		
	£	s. d.		£	s. d.
Members'			Secretary's Stationery ...	...	1 17 10
Subscriptions, Arrears	12	10 0	Secretary's Cash Expenses ...	...	10 12 0
Current	46	16 6	Excursion Circulars	29 8 6
Advance	1	5 0	Members' Cards	10 19 6
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Arrears	2	11 2	Treasurer's Cash	2 0 0
Current	7	17 9	Bank Charges	0 10 0
Interest from—			<i>Naturalist</i> —		
£200 4% Consols ...	...	8 0 0	<i>Naturalist</i> to Members	131	15 9
£159 10s. 11d. 4% Consols ...	...	6 7 6	<i>Naturalist</i> Exchanges	5	12 6
Booth Fund £100 3½% Conversion	3	10 0	Binding ...	...	0 19 4
Cheeseman Fund £100 3½% War Loan	3	10 0	Extra Pages ...	6	12 0
			Editor's Postages ...	10	0 0
<i>Naturalist</i> —					154 19 7
Subscriptions, Arrears	22	10 0			
Current	89	0 0			
Advance	2	10 0			
		114 0 0			
Discounts ...	...	2 11 11			
Expenditure exceeds Income by	...	5 19 7			
		£214 19 5			£214 19 5

BALANCE SHEET, November 22, 1941.

LIABILITIES.			ASSETS.		
	£	s. d.		£	s. d.
Balance due to Treasurer ...	...	19 18 11	Cash at Bank ...	...	102 13 2
Life Members Account ...	...	358 1 0	Cash in hands of Secretary, Mammals, etc., Committee ...	...	0 17 6
Booth Fund ...	...	100 0 0	£100 3½% Conversion Stock ...	...	100 0 0
Cheeseman Fund ...	...	100 0 0	£100 3½% War Loan ...	...	100 0 0
Subscriptions paid in advance ...	...	3 15 0	£359 10s. 11d. 4% Consolidated Stock	359	10 11
Balance of Assets over Liabilities	...	126 6 8			
			Subscriptions unpaid ...	90	5 0
			Written off ...	45	5 0
				45	0 0
S. D. PERSY FISHER,	£708	1 7	Examined and found correct,		
<i>Hon. Treasurer.</i>			30th November, 1941.		£708 1 7
			W. D. HINCKS.		
			JOHN R. DIBB.		

The NATURALIST

A MONTHLY
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PRINCIPALLY FOR THE NORTH OF ENGLAND.

Edited by
H. PEARSALL, D.Sc., F.L.S., F.R.S., and W. R. GRIST, B.Sc.,
The University, Leeds.

with the assistance as referees in special departments of

J. M. Brown, B.Sc., F.R.E.S.
W. H. Burrell, F.L.S.
Chris A. Cheetham, F.R.E.S.
Ralph Chislett, F.R.P.S., M.B.O.U.
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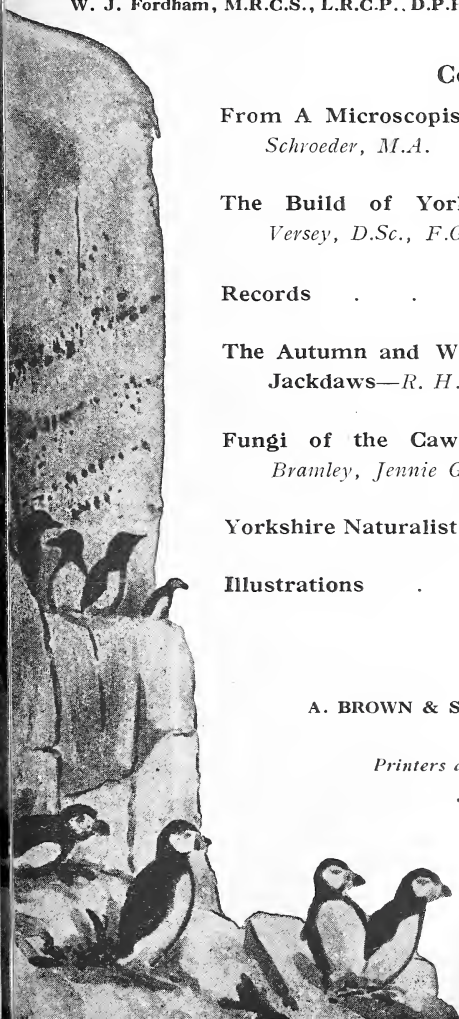
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YORKSHIRE NATURALISTS' UNION

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The constitution consists of the President, Treasurer, and Secretary of the Union, and the Chairman of each of the Sections and Committees, and the Divisional Secretaries.

A MEETING of this Committee and all members interested in **ECOLOGY** will be held at LEEDS UNIVERSITY in the BOTANY COMMON ROOM (Beech Grove Terrace) on Saturday, February 7th, 1942, at 3-30 p.m., to discuss a method to unite the work of the Botanical, Zoological and Geological Sections in this aspect of the Union's activities.—C.A.C.

YORKSHIRE NATURALISTS' UNION

Section B—VERTEBRATE ZOOLOGY

President: E. WILFRED TAYLOR

A MEETING of the above will be held on Saturday, 14th February, 1942, in the Hook Room of the Leeds Church Institute, Albion Place, Leeds, at 3 p.m. Members, associates and friends are invited.

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FROM A MICROSCOPIST'S NOTEBOOK

W. LAWRENCE SCHROEDER, M.A.

WHEN I compare my wide roving commission with that of the specialist, I think myself 'happy in my irresponsible dilettantism. Not long ago, I came across a research worker groaning over the flagellates: the loan of Pascher's *Süsswasser-Flora* volume afforded temporary relief, but I was struck by the remark made, 'You amateurs can look at what you like; I'm obliged to like what I am expected to look at; and so often the side-tracks seem so alluring; paths I have no time to follow.' Only the other day a medical man, to whom I showed a special slide of diatoms, and who, presumably, used the microscope at times during his preparatory career, exclaimed, 'Well, that is the first time I have seen anything really beautiful under the microscope.' But then, he was Irish, with a perfect bedside manner, and he knew that such a comment would please if not convince me.

This introduction will explain the heterogeneity of my spasmodic contributions; for my collection of slides includes coal and rock sections, insect preparations, marine life, diatoms, seeds, algæ, plant sections, polariscope objects, and anything that can be coaxed into balsam or glycerine. At the moment I have the foot of a mouse I found waltzing over my study-table on Sunday night last, in terpeneol, in the hope of proving it a good polariscope object.

My immediate selection from the notebook concerns a collection made at Leathley one day in March, some years ago. A tree about ten feet in diameter at the base had been cut down; a little hollow had been formed on the exposed surface; the water that had there collected was not more than a pint and a half. I took some of the moss that had grown about the edge, and some of the algæ in the water. A first examination revealed the ciliate *Loxophyllum rostratum* in fair number, Bdelloid rotifers, *Amoeba proteus*, and water-bears, *Macrobiotus Hufelandii*. *Oscillatoria* filaments were sliding alongside of each other, or bending slowly from side to side; and nematoids were squirming here and there. Two days later I examined a very small portion of the moss. I counted twenty-five rotifers—*Philodina citrina*, busily feeding; and a most interesting ciliate, *Spathidium hyalinum*, shaped like a jelly-bag, with the contractile vacuole at the posterior end: it was *c.* $75\ \mu$ long, and *c.* $35\ \mu$ wide. A week later the *Amoebæ* were in fine form, and a number of *Actinophrys sol*—*c.* $36\ \mu$ by $27\ \mu$ —were on the leaves of the moss. *Euplotes (charon)*, with eight frontal styles, five anal styles, and several ventral styles less regularly placed, obligingly walked on the cover-glass, affording me a good

opportunity for observation of the ventral aspect. Later, it politely turned over, so that I had a vivid picture of the six beaded edges of the dorsal furrows; there was a posterior contractile vacuole. The dorsal keel is well pronounced, not quite central, but a little to the left. Of the posterior and the frontal styles, only a proportion are engaged in the actual walking. The rest keep up a fluttering, as if concerned with the movement of the water. The variation in size—of those examined—is noteworthy; the largest was *c.* $60\ \mu$ long and *c.* $45\ \mu$ wide; the smallest was *c.* $45\ \mu$ long and *c.* $27\ \mu$ wide.

The *Philodina* rotifers seemed to have increased. On a couple of moss leaves, with a little debris, there were over a dozen. I was unlucky with a life slide of the rotifers: they all died, probably from overcrowding. But on March 25th the flagellate—*Oicomonas termo*, *c.* $12\ \mu$ by $9\ \mu$, appeared in number, together with *Colpidium striatum*, a ciliate. Some of the latter were in division; so the bacterial feeding must have been good. *Cercobodo simplex* (*c.* $12\ \mu$ by *c.* $10\ \mu$) sluggishly and in amoeboid fashion moved slightly on the slide. But the high light was a water-bear sliding on the surface film of an enclosed bubble of air. Twelve days later, the water-bear was still bravely holding its own. On March 30th, *Codonocladium umbellatum*, one of the *Protomastiginæ*, a colonial flagellate, was seen on the moss.

Later in the year, August 3rd, the blue-green algæ had taken control, with *Phormidium interruptum* in a compact mass; but life still flourished, rotifers and infusoria were in abundance at the bottom of the dish; small *Naviculæ* were moving and *Scenedesmus obliquus* and *Dictyosphaerium* had appeared, together with other unicellular green algæ.

In December, twenty-two months after the collection had been made—there was a severe frost, and the water in the jars was mostly frozen, but at the bottom of the Leathley jar there were about ten *Nais* wriggling.

Almost exactly a year later—in December—the jar was full of life—some flagellates, and a ciliate *Halteria grandinella* in abundance, with the desmid, *Closterium*, some filaments of *Spirogyra*, and the green *Characium Pringsheimii*.

In the following July, nematoids, amoebæ and some small ciliates, together with the alga *Dictyosphaerium pulchellum* seemed dominant; but there was a hitherto unnoticed rotifer. *Furcularia forficula*.

I venture to think that this three-year record of a couple of ounces of water with a little moss and some algæ, from a tree-trunk hollow, is worth meditating. The bottle in which was the material, was kept corked.

THE BUILD OF YORKSHIRE

H. C. VERSEY, D.Sc., F.G.S.

[Presidential Address to the Yorkshire Naturalists' Union
read at York, December 6th, 1941.

FOR eighty years members of this Union have been engaged in the study of the natural history of this county. Most of this work has consisted of the recording of the existence and distribution of animals and plants, the result of which is a monumental list of records. These records, appearing in *The Naturalist* in small type, tend to get smothered, but the Union has attempted summaries, such as West's 'Alga Flora,' from time to time in the *Transactions*. Even these summaries, in my opinion, have only a limited value if they are merely lists of species and localities. Repeated visits to one district in an endeavour to make as full a list as possible of ferns or flies or fungi or fossils may be useful to a point, but if the result of these visits is just a list of species, then I submit it is time to consider whether it is worth while. Recently, in a report given after a Union field meeting, a speaker said, 'We found what we expected to find and we found nothing that we did not expect to find.' In these circumstances is it not desirable to call a halt to the species-hunting and to try to weigh up such facts of distribution as we have at our disposal? In the early days of the Union such theoretical excursions would have been premature, but so many years of constant collecting have surely given us sufficient material on which to make a start, and in these days of limited and difficult travel what little leisure naturalists have might well be devoted to 'arm-chair' natural history.

A presidential address offers an opportunity for unhindered speculations on general lines and I find that many of my predecessors have taken the opportunity. Professor Pearsall's ecological survey in 1937 was noteworthy in this respect. Discussions of this type, even if incomplete, offer the best, in fact the only, means of presenting the results of the work of one section to the members of another. These are days of increasing specialisation, and sections tend to work independently. This is probably inevitable, but records made by botanists may be very useful to entomologists and those of the geologist to botanist and bryologist. It is not the mere record of the existence of a species at a given point which is valuable but the additional details of habitat which are often omitted. May I present this idea from my own point of view as a geologist. I am concerned, among other things, with the reconstruction of the geography of the past. Much of this reconstruction is possible from a purely inorganic study of

the rocks, but the evidence taken from the contained fossil remains is no less important. The basic principle of geology is that the present is the key to the past and it follows that we cannot properly understand the life of the past unless we know the controlling circumstances of present-day life. As a geologist I should like to see the records of the existence of a species accompanied by details of the habitat, soil type, soil thickness, hardness of water, slope of ground, etc. Geology dealing largely as it does with marine deposits, is especially interested in observations of life in modern seas, and it is regrettable that marine biology figures to such a small extent in the activities of a scientific body situated in a county with such a long and varied coast. I therefore especially welcome the election of Professor Hardy to the Presidency of the Union for next year.

Where a species shows small variations through its area of distribution an attempt might be made to correlate these variations with slight differences in habitat. Naturally this cannot be done from an occasional specimen or two. Large collections are necessary for the value of the evidence is likely to be greater for the more widely spread and abundant species, and such collecting is not likely to prejudice the survival of the species. Reference may be made, in this connection, to the extensive collections made by the late Mr. Greevz Fysher of *Helix nemoralis* and similar species in connection with the researches of Captain Diver and others. I am quite aware of the important work done under the auspices of the Ecology Committee in the Botany Section, but we might now enlarge our conception of ecology to include animals as well as plants and to embrace all the sections of the Union. This might be done best by co-ordinating all the sections' work on one or two specific problems or specific areas. These days prevent the usual wide areal spacing of Union field meetings. Why not, therefore, select a central area of varied topography, likely to give contrasts in fauna and flora, and visit it repeatedly until a collective report can be presented in a resuscitated *Transactions* of the Union? Such collective work should be contributed by all sections, by the expert and by the ordinary member alike. Let all the members, especially those we hope to recruit, realise that with proper direction they can do more than just collect, and the Union would, in consequence, I feel sure, benefit in the increased zest and an increased number of members.

In these visits we should not rigidly adhere to the Watsonian vice-counties for, while the use of these vice-counties may be necessary for record purposes in order to conform to established practice, it tends to obscure many of the fundamental reasons for the distribution of the organisms studied as in no case

does the vice-county coincide with any physiographical or ecological unit. One of the most important factors—perhaps the basic one—controlling animal and plant distribution is the character, arrangement, and spread of the rocks. As a small contribution to the work, the desirability of which I have just stressed, I wish to put before you a brief summary of the stages by which our large county has developed its present landscape, the stages by which large areas of limestone or of clay or of sandstone have been uplifted and exposed, the stages through which our drainage system has been evolved—in short, the stages by which many of the controlling factors of distribution have been developed. It is almost platitudinous to state that Yorkshire offers to the geologist an almost complete epitome of geological history; every period of geological history has left in its broad acres evidences of uplift or depression, of deposition or denudation.

Geological history consists of an alternation of episodes of mountain building with periods of so-called quiescence; really periods of preparation for more mountain building. This alternation represents the periodic reaction of the rocks of the earth's crust to long-maintained forces in the body of the earth. Ordinary experience teaches that simple substances like steel, wood, sealing wax, and plasticene react differently to a given force. Some are rigid, others plastic; some are rigid only if the force is applied for a short time, but bend if the force is more continuously applied. So in the crust of the earth, rocks collectively and individually vary in the strength of their reaction to terrestrial forces. Individual reaction may be experimentally tested, but collective reaction can only be deduced from field observations of folding and faulting.

Geologists have divided the earth into mobile areas and rigid areas on this basis; the mobile areas are those which have oscillated in level between very wide limits, deep troughs in one geological period and high mountains in the next. The rigid areas, on the other hand, tend to oscillate very little with a general tendency to remain elevated above the general level of the earth. This contrast is not persistent, for when a mobile area becomes a mountain chain the pressure producing the folding compresses and stiffens the rocks so that when the 'revolution' is over the area takes on some of the characters of a rigid area; subsequent periods of folding will intensify this rigidity. In general the rigid areas are the continental massifs, while the mobile areas either border them or occur between them. The continents themselves have been built up by repeated mountain buildings and thus consist of areas of contrasting rigidity. Thus when the Alpine mountain chain was uplifted the rest of Europe was affected partly by the formation of large fault-blocks and partly by the formation

of broad upwarplings, the intensity of the movements depending on the distance from the mobile area. During geological time, in Europe, the areas of greatest mobility have moved from north to south and in any given latitude the movements will, broadly speaking, have diminished in intensity in the successive revolutions. My task, therefore, is to fix the position of Yorkshire in relation to rigid and mobile areas during the three main revolutions which have taken place since the formation of the earliest fossiliferous rocks.

The Lower Palæozoic rocks of Britain were accumulated in a long trough or geosyncline, but Yorkshire lay towards its margin. Rocks of this age in Ribblesdale and Crummackdale are much thinner than those in the Lake District and Wales, pointing to proximity of land to the east. The position and size of this land cannot be fixed with certainty. At the close of Silurian times all these rocks were disturbed by mountain building, and while the sediments in the main trough were folded into a complex mountain chain trending along the line of the trough, in Yorkshire and East Westmorland the trend of the folding points to its having been largely controlled by a rigid mass in the Pennine area. One may relate this rigidity to the basement of pre-Cambrian rocks which must underlie the Pennines and of which traces are seen in Chapel-le-Dale and Ribblesdale.

A long period of land conditions followed, with considerable denudation, and the accumulation of red sandstones and conglomerates—the Old Red Sandstone. Very little representation of this formation remains in Yorkshire, but the thick conglomerates exposed near Sedbergh may belong here. One may visualise them as having been deposited on the edge of the rigid area, mentioned above, which had been uplifted. When the Carboniferous sea encroached on the continent from the south it spread over an area of diversified landscape and progressively covered it. In Yorkshire it covered first the ground known now as the Craven Lowlands and passed into a narrow gulf between the Northern Pennines and the Lake District into East Westmorland. The Northern Pennine area, the rigid area of an earlier epoch, remained as a land area for some time. Slightly later in Carboniferous times the rigid area was covered by the sea, but at this time the thickness of rocks deposited on it was generally less than those formed in the Craven Lowlands. There were differences in lithology, for the rocks on the rigid area were limestone, etc., of very shallow-water lagoonal type, while those to the south included thick shales originating in deeper water. This contrast in the two areas continued for some time, and in both Millstone Grit and Coal Measure times the thickness of sediment attained a maximum in the region to the south.

The end of Carboniferous times was marked by a second major revolution. At this period the main axis of movement lay to the south of England, from Devon and Cornwall to Kent. Yorkshire was thus definitely part of the continent and its reactions to the movement were controlled by variations in rigidity—variations related to the thickness of Carboniferous rocks. The areas of thin rocks (more rigid areas) were broadly upwarped, with or without faulting, while the areas of thicker rocks became folded into rather sharp folds whose trend was controlled by the margins of the rigid areas. It was during this period of folding that the Pennine Fold was initiated, and by its uplift easterly and westerly basins of Permian rocks were separated. This fold attained its maximum height in the so-called High Peak Dome round which a number of minor folds are arranged roughly concentrically.

The rigid block to the north had a complicated history during the revolution. In mid-Carboniferous times it was elevated and scree from its steep edges are found in the Bowland Shales which accumulated to the south. Towards the end of the Coal Measures it was relatively depressed, but this may have been due to the greater uplift of the marginal folded area.

In early Permian times again a second positive, *i.e.* upward, movement took place and permitted the formation of the alluvial fans of the Brockrams of South Edenside. This movement produced a gentle tilt to the east and up this tilted surface the Permian sea slowly transgressed.

In North-West Yorkshire, round Sedbergh, the uplifted block and the contemporary anticline of the Howgill Fells were squeezed together producing a thin zone of crushed and contorted limestone. The behaviour of the area between the rigid block—bounded by the Craven Fault system—and the true Pennine fold is not clear. The area is crossed by a number of folds trending in a direction between S.W.—N.E. and E.—W. During this rather complicated history of the rigid block, whether we regard it as a single unit, after Kendall, or as two units, the Alston and Askrigg blocks, the uplift must have been irregular with the consequent formation of minor folds which would be most obvious in the area north and south of Stainmore. Three folds with a radiating trend and increasing amplitude to the east may be attributed, at any rate in their earlier phases, to this effect. The Stainmore or Cotherstone Syncline is the most obvious of these, but the Middleton Tyas Anticline is more quoted. Because of its loss of amplitude to the west and because of its W.N.W.—E.S.E. trend, I cannot agree that this fold is a repetition of the folding along the line of the Howgill Anticline.

From Permian into Triassic times the deposits slowly

encroached over the whole area and it is likely that during the formation of the Keuper Marl the whole county was covered. Some authors declare that the same condition was maintained during the Jurassic, but there are certain facts which suggest the presence of a land area over the Northern Pennines. Lateral changes, lithological or mineralogical, at many horizons, such as the Dogger and the Corallian, indicate a land area at no great distance to the west, and the late S. S. Buckman argued for such a land—his *Juropenninia*—from the distribution of the ammonite faunas. More recently Arkell has expressed a similar view. It seems likely that the slow sinking which the Cleveland area experienced during the Jurassic synchronised with an upward movement on the margins. To the west of Cleveland some sort of a pivot may be visualised about which the concealed rigid mass moved to lift the area to the west above sea-level and to depress the area to the east with its cover of Jurassic rocks. This depression and sedimentation of the Jurassic rocks was not uninterrupted. Local shallowing resulting in the formation of an ironstone facies in the Middle Lias and the facies variation shown by the Dogger and associated beds, both point to differential movement in this area of sedimentation-subsidence.

I have discussed elsewhere marginal movements at Market Weighton over an area which became the site of important movements in late Jurassic times. These movements took place in a narrow zone crossing Central and Western Europe. The Jurassic rocks up to and including the Kimmeridge Clay, between the Humber and the Derwent, were flexed into gentle folds, and the continuation of the movement into Lower Cretaceous times is indicated by a parallel fold near Caistor in Lincolnshire, the continuation of which to the north-west may explain a small roll in the Bunter near Selby. Movement at this period in the Howardian Hills area took the form of faulting, the complex pattern of which is well reflected in the topography. I have followed Kendall in regarding this faulting as the surface effect of more deep seated movement and have seen in it evidence for the eastward continuation of the margin of the rigid block of the north-west. It is nearly certain that, as a result of these Saxonian movements, large areas in the west of the county were again dry land and were not covered again until the Chalk sea gradually transgressed over the whole area, and, in doing so, produced a plane of marine denudation on which the Lower, Middle, and Upper Chalk were successively deposited. This Chalk thus covered a region of variable tectonic behaviour, a region in which specific structural units can be approximately delimited.

The outstanding event of Tertiary history was the rise of the Alpine system of mountains. Britain was now farther

removed from the main geosyncline, and the effects of the movement, therefore, were essentially continental. They were in essence a reassertion of earlier lines of movement such as doming in the Lake District, block uplift in the Northern Pennines, and folding along the Pennine axis. The western areas of the country, the sites of an earlier revolution, were uplifted most and the whole country received an easterly tilt down which streams began to run towards an ancestral North Sea. In Yorkshire this easterly tilt was broken by a rise of land running through the county from north to south, the Pennine anticline in the south and the rigid fault-block to the north. From these two uplifts consequent drainage to the east and to the west was initiated. These early streams must have been flowing over a surface of Cretaceous, if not of early Tertiary rocks. Comparatively quickly this cover would be removed by erosion and the river courses become super-imposed on the older rocks so that many of them are seen to traverse the earlier folds without any diversion and to cross escarpments in gorges.

If the Cretaceous rocks, as has been argued, were deposited on a plane surface this surface would be re-exposed, but it is doubtful whether any traces of it still remain. Some authors have regarded the widespread peneplane in the Pennines and Lake District as the stripped pre-Cretaceous surface. This is unlikely because when this peneplane is extrapolated to the east it appears to coincide with a similar surface in Cleveland and the Wolds which I have termed elsewhere the Wolds Peneplane. It would seem, therefore, that the Cretaceous rocks of the Pennines were removed quite early in Tertiary times and the country reduced to a low level, only to be tilted again in the main mid-Tertiary movements.

Cowper Reed regarded all the Pennine rivers in their early stages to have followed more or less parallel paths to the North Sea. The direction in which the pre-glacial valleys of the Nidd and Wharfe crossed the Magnesian Limestone ridge suggests that this parallelism might not be general and that these two streams may have been tributary to the early Ure. The line of the pre-glacial Wharfe valley, if continued, would coincide with the low col in the Howardian Hills through which the Derwent broke in the late Ice Age.

The uplift in the rigid block, producing as it did a tilted block with its maximum uplift on the borders of the block, would give rise to a series of streams with a general centripetal direction which became tributary to the major central streams, Ure and Swale. The head streams of the Wharfe, Bishopdale and Coverdale, may be regarded as following the lines of this centripetal drainage. Subsequently streams flowing down the steeper edges of the block extended their valleys by headward

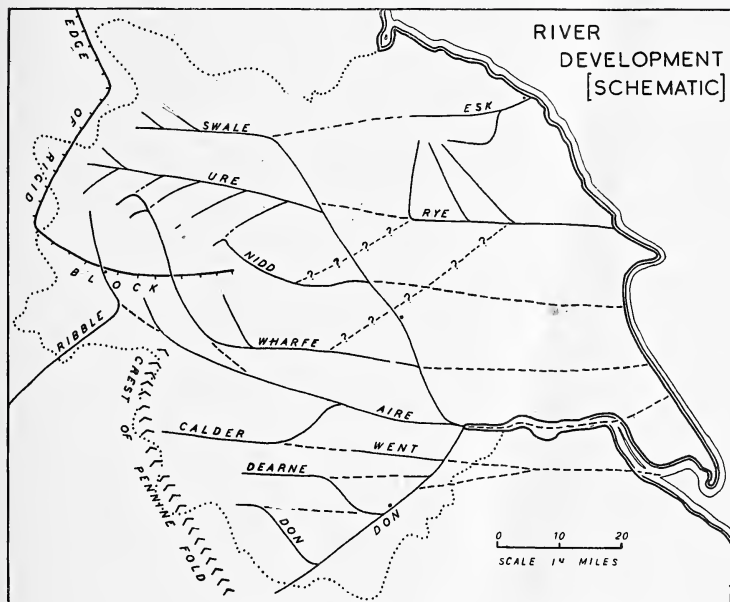
erosion into the fault-block and thus, some of the centripetal streams were successively captured by the early Wharfe and Nidd. The Middleton Tyas fold, although in part pre-Permian, must have been partly reaccentuated for it now forms the watershed between the Swale and the Tees.

When the soft Triassic rocks of the Vale of York became exposed to denudation subsequent drainage became possible, with river-capture as a necessary consequence. Of the Pennine streams the Aire was the only one to maintain its direction. This was probably due, as suggested by Kendall, to its augmented volume (Aire plus Wharfe *via* the Guiseley Gap), or to the fact that in the earlier cycle it crossed the Chalk on the site of a small cross fold, towards which the Wolds peneplane appears to dip. The streams which began as consequents from the arcuate Pennine fold became controlled by the fault and joint pattern of the Coalfield. A rectilinear drainage was locally developed, as, for example, round Leeds, and capture became possible by strong streams eroding headward along one of these structure lines. Lower Carter has explained the diversion of the early Don and Dearne on such lines, and it is possible that the Calder, which originally followed a line to the west marked by the Went Valley, was so diverted to the north-east near Wakefield.

The eastward continuation of the Ure and the Swale was prevented by mid-Tertiary movements in Cleveland. The buried rigid block, whose movements in Jurassic times have been referred to, was again disturbed. Two stages of disturbance can be recognised. The first of these resulted in further movement in the Howardian fault system including a line of disturbed Chalk eastwards to Flamborough Head, the development of an echelon fault system along the coast and the wrinkling of the cover of Jurassic rocks into a series of elongated domes and basins. Any irregularities caused by these were quickly planed down because they are truncated by the Wolds peneplane. The second stage of the movement was a gentle doming of the peneplane with the development of a radial drainage-system. The southerly streams in this system drained into the furrow, partly synclinal and partly fault formed, of the then Vale of Pickering, while the northerly streams drained into the Esk, probably the beheaded remnant of the early Swale. During the arching of the peneplane the Esk entrenched itself, but it has lost some of its head waters through the piracy of the more active Leven.

The story of the make up of our county in the relation of distribution of fauna and flora would be incomplete without a reference to the events of the Ice Age. Prior to the onset of glaciation the general topography of the county was probably not unlike that of to-day, except that the Holderness area was

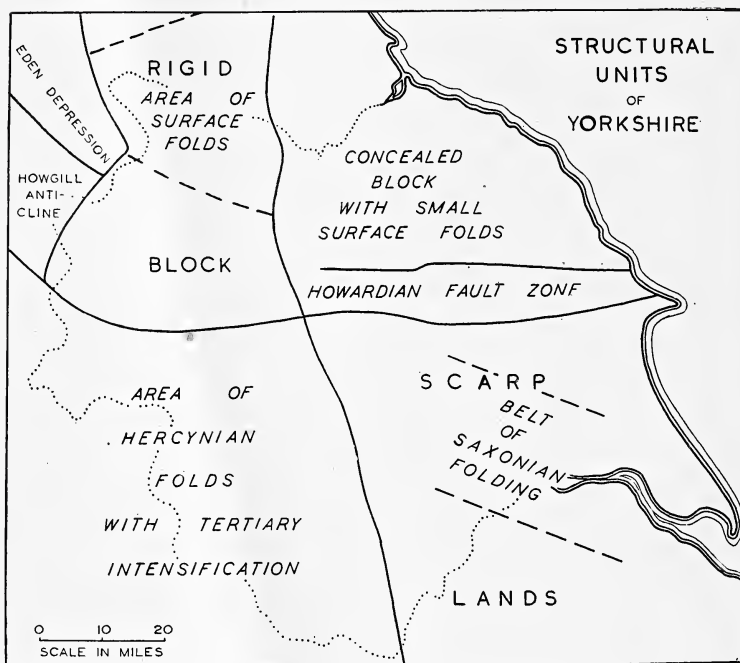
submerged, the Vale of Pickering a funnel-shaped arm of the sea with, possibly, a deeper embayment at Teesmouth. The glacial deposits may be attributed to successive glaciations with a long interval separating the period of the 'older drift' from that of the 'newer drift.' During this interval extensive denudation took place so that the older drift is represented by isolated patches such as the clay deposits on the Wolds and the leached drift of the Pennine foothills. The newer drift is represented by the thick boulder clay spreads of Holderness



and the northern Vale of York and by the moraines and gravel deposits in the Pennine river valleys. To a late stage in the newer drift episode belong the laminated clay of the glacier lakes, the overflow of which gave rise to the deep trenches, dry valleys, so familiar to observers in Cleveland and the Pennine foothills and often to permanent diversion of the drainage.

The principal structural units into which Yorkshire may be divided are the immediate result of Tertiary earth-movements. In most cases, however, the amount of movement involved, as measured by the dip of the strata, is small, but my main thesis is that all these small movements are really the surface reaction to the movement of more deep-seated units, whose behaviour is determined by their previous history. These small movements illustrate the principle of posthumous

movement, enunciated first by Godwin Austen and brilliantly developed by Kendall but presented here in a slightly modified form. It is not just the re-accentuation of individual fold lines or fault lines but rather the repetition of movement of a structural unit. The successive movements, although in the same direction, are progressively weaker, and because the areas become covered in the intervals with newer rocks, the effects of later pressure will be revealed in different ways.



It is possible that the lines of later fold uplift will not coincide with earlier fold lines but rather a belt of complicated folding will react, in a later period, as a broad gentle arch, the core of older rocks being then too rigid for close folding. The Pennine fold movements come into this category.

The role of a fault-block as a horst results in the periodic addition of stiffened material to its margins. Thus in successive movements the edge of the unit where the rocks yield by fracture will be more and more distant from the centre of the block. The faulting is repetitive, but the actual locus of the faulting moves outwards. The area of the Craven disturbance illustrates this. Any disturbance of the sedimentary cover of a fault-block can only be due to the movement of the concealed rigid mass, but the location of minor folds will be somewhat

accidental and due to such conditions, as the thickness of the cover, the form of the concealed surface of the rigid basement and variations in the fault movement on its margin.

I have tried to show that our county has had a complicated history, a history which is still being made. This long story has only been understood as a result of the observation of present-day conditions for, once again, the present is the key to the past. Such observations can never be complete for geology, being largely an inductive science, lacks those factual statements known to physical and chemical science as laws. There is, therefore, plenty of scope for continuous attention to simple processes and for recording familiar changes in coast-line, in river erosion and the like. Such observations require no specialised knowledge and can be carried out by the naturalist, by the botanist studying flora of the river valley or by the ornithologist studying the birds of the seashore. History shows us many examples of the important results accruing from simple observations. The dawn of modern physical geology broke as Jean Guettard maintained his watch on the change of shape of a single crag of sandstone in the Forest of Fontainebleau, and Yorkshiremen remember that the story of the Millstone Grit was revealed to Sorby, the first geological President of the Yorkshire Naturalists' Union, as he watched rain washing away sand on the floor of an old quarry.

There is no close season for geology and the laboratory door is always open ; open for an influx of naturalist-geologists into the ranks of the Union. What are essential for these recruits? I cannot do better, in concluding my address, than modify Darwin's dictum that the essentials for the amateur geologist are : a little reading, a little hammering, a keen eye, and a little thinking.

RECORDS

COMMON SCOTER AT SWILLINGTON

ON Sunday, November 2nd, 1941, while examining a large number of ducks on the large ing at Swillington, I was surprised to see a party of Common Scoter consisting of four adult drakes, one immature drake, and fifty-two ashy-cheeked females. A very good view of the party, which cruised in a compact flock away from the other ducks most of the time, was obtained and the identity of every bird carefully ascertained. Although the occurrence of Scoter inland is well recognised at the time of the spring and autumn movements, I having seen odd birds at these times before at Swillington, this was an unusually large flock at a rather late

period in the year. These birds were watched for nearly an hour and just after 5 p.m. they rose, circled once, and then flew rapidly in the direction of Halton, which suggests that they were going to the North East coast. I would be glad to hear if anyone has noticed any parties inland at or about this time, or anything which might help to solve whether this was an isolated party or part of a larger movement.—A. G. PARSONS.

WAXWINGS IN THE SCARBOROUGH DISTRICT

DURING November, 1941, a considerable invasion of Waxwings took place in the Scarborough district, where flocks of these birds were seen feeding upon the berries of service trees, cotoneaster, hawthorn, and rose hips. The first to be recorded were three seen on the Scarborough racecourse on November 5th. These were followed by others as enumerated below : three in Peasholme Glen, Scarborough, November 6th ; twenty-four in Peasholme Glen, Scarborough, November 8th ; forty in Scarborough Cemetery, November 16th ; two near the Scarborough Museum, November 19th ; a flock varying in numbers from forty to a hundred individuals which daily visited some service trees growing near the Scarborough Museum for a week in mid-November, only ceasing their visits when the trees were stripped ; fifty at Spikers Hill, near Ayton, November 19th ; three at Scarborough Mere, mid-November ; one at Ramsdale Valley, Scarborough, mid-November ; six at Harley Street, Scarborough, November 27th ; five at Scarborough Mere and several single birds seen in mid-November (these do not include the three seen at the same place as recorded above). At the time of writing, on January 2nd, 1942, all the birds seem to have disappeared from the district. Mr. Hyde-Parker tells me that a single Waxwing was seen feeding on cotoneaster berries at Filey in mid-November.—W. J. CLARKE.

MUTILLA EUROPAEA

IN response to the request by Mr. T. Stainforth for information about the occurrence of *Mutilla europaea* in Yorkshire, during many years wandering over the moors around Lilla Cross and Langdale End I have seen perhaps half-a-dozen examples, all of which were wingless females. The first of these I brought home and gave to the late Wm. Pearson, of Scarborough, the others I left undisturbed. All of these were seen during the month of May, but, unfortunately, I did not keep records of the dates after passing them on to Mr. Pearson, who was then our local authority for these and similar creatures.—W. J. CLARKE.

THE AUTUMN AND WINTER HABITS OF ROOKS AND JACKDAWS

R. H. BROWN

THESE notes refer to certain habits of Rooks (*Corvus f. frugilegus*) and Jackdaws (*Colinus m. spermologus*) as observed principally during the autumn and winter months of the past eleven years, 1929-1939, in the neighbourhood of Cumdivock, which is a hamlet lying seven miles south-west of Carlisle. One mile to the east of Cumdivock there is a rookery of a few dozen nests in a copse by the side of a small stream: this is the Gill rookery. Half a mile to the west of Cumdivock there is another rookery of similar size in the trees about a country house: this is the Cardew rookery. Three miles to the west of Cumdivock is a large rookery of several hundreds of nests in the trees surrounding Crofton Hall and Crofton Park: this is the Crofton rookery. All three rookeries are in deciduous trees, all three have parklands or grass-lands of varying acreages surrounding them, while all three sites are adjoining roads and at no great distances from houses or farm buildings.

The winter roost of these rookeries is in a deciduous wood, with overflow in a pine copse, a few hundred yards south of Rose Castle, which lies three miles south-east of Cumdivock. The pine copse is also used as a nesting rookery by a few dozen pairs. Besides these three rookeries, other rookeries also use this winter roost, but these notes deal chiefly with the behaviour of the birds from the Crofton and Cardew and Gill rookeries. It may, however, not be out of place to mention that flights come in to this winter roost from the outskirts of Carlisle, seven miles distant to the north, and also from the rookeries on Faulds Brow, a stretch of heather-clad moor lying at an altitude of eight hundred feet to one thousand feet, and distant six miles south-west from the winter roost.

In most years the roosting-flights to the winter roost were not observed before mid-August, occasionally September. The following table gives the date for each year on which the first roosting-flight of the autumn was noticed, together with the hour at which the main flock passed over Cumdivock. Throughout this paper all references to the hour refer to Greenwich time.

1932. September 3rd.	1936. August 12th, 7-30 p.m.
1933. August 23rd.	1937. August 14th, 7-15 p.m.
1934. August 28th, 6-45 p.m.	1938. August 25th, 6-30 p.m.
1935. Sept. 5th, 6-30 p.m.	1939. August 10th, 7 p.m.

On July 24th, 1930, the Carden Rooks flew in a flock about 7 p.m. to the Crofton rookery, as if intending to roost there for the evening, while on July 22nd, 1938, the Carden Rooks

passed over Cumdivock at 8 p.m. in the direction of the winter roost. They were not again seen to fly in this direction until August 25th, 1938, when they flew in a compact flock to the Gill rookery, the two rookeries joined forces, and at 6-30 p.m. flew to the winter roost.

The Rooks and Jackdaws on their morning-flight from the winter roost come over first, a few odd birds, then small parties, and finally a line of birds straggled out: as they approach the neighbourhood of their respective rookeries they break away from the line of flight and either settle in trees near their own rookeries or else in their own nest-trees, where they sit frequently for half-hour or longer before descending to the grass-fields to begin feeding. The evening flight is performed much as the morning flight with the main body of birds straggled out in a long wavy line. Thus on September 3rd, 1937, with the sun shining from a clear sky, the Rooks and Jackdaws passed over to the winter roost from 5 p.m. until 7 p.m. with an interval between the various flocks as if each flock kept its separate identity. Birds at times broke the line of flight to circle around, occasionally to a fair altitude, with a certain amount of cawing and chacking, and occasionally diving earthwards in zig-zag descent. Sometimes the birds of a rookery may assemble until almost dusk in a grass-field beside their own rookery, then fly to the winter roost: or they may sit about the nest-trees of their own rookery until about dusk and then depart. On October 20th, 1935, the Carden Rooks fed in a grass-field adjoining the rookery until 5-15 p.m., when they flew to the winter roost. On December 7th, 1933, the Gill Rooks with Jackdaws fed in a partially-cleared turnip field until 4-10 p.m., then flew off in a straggling line to the roost. On November 18th, 1929, the Crofton Rooks gathered in their nest-trees, with much cawing, until about dusk, then flew to the winter roost. On January 12th, 1930, the Crofton Rooks with Jackdaws gathered in a dense flock in a grass-field adjoining the rookery until about dusk, when they rose in a flock and flew to the roost.

On December 21st, 1929, when the winter roost at Rose Castle was under observation, the various flocks of Rooks and Jackdaws assembled in a compact flock in a grass-field adjoining the roost, with a great amount of cawing and chacking; then at dusk the dense flock of several thousands of birds, still cawing and chacking, flew to the roost trees, and for long after dusk the noise of the birds was like the sound of breakers on a far-away shore.

The winter roost was again watched from 3-30 p.m. until 4-20 p.m. on December 17th, 1938. The various flocks on this occasion did not assemble in a grass-field, but as each flock came in to the roost the birds glided down to the trees

in the deciduous wood or in the pine copse : sometimes a flock of a hundred birds or more that had been settled in the trees would rise with a great deal of cawing and chacking, fly around above the trees for several minutes, then re-settle. Dusk was at 4-10 p.m., and late flocks were still arriving and adding to the tumult : from a distance it sounded like the noise of breakers on a far-away shore.

Attention has been paid to the hour at which the first flock of Rooks and Jackdaws passed over Cumdivock on a morning and the hour at which the last flock passed on an evening. The following brief summary is based on records obtained during three winters :

	First Flock Morning.	Last Flock Evening.	"Length of Day" for Flock.
August 15th	—	7-15	?
September 15th	5-30	6-15	12 hrs. 45 mins.
October 15th	6-30	5-20	10 hrs. 50 mins..
November 15th	7-15	4-30	9 hrs. 15 mins.
December 15th	8-0	4-15	8 hrs. 15 mins.
January 15th	8-0	4-20	8 hrs. 20 mins.
February 15th	7-15	5-15	10 hrs.
March 15th	6-15	6-40	12 hrs. 25 mins.

There may be variations of as much as twenty minutes between the time of one morning flight and the next morning flight according to the weather conditions prevailing during those two mornings. An exceptionally late morning flight was noticed on February 3rd, 1939, when the birds were about thirty-five minutes late—8-20 a.m. instead of 7-45 a.m. Weather conditions that morning were very misty after a night of hard frost ; the trees and hedges were white with hoar frost. A clear sky, with absence of wind, brought the birds over as early as possible ; an overcast sky, with wind and rain prevailing, delayed them most of all. The same conditions affected the evening flights, but in reverse ratio, *i.e.* an overcast sky with wind or rain brought the birds over to the roost sooner than usual ; a clear sky delayed their flight. A late evening flight was noticed on December 25th, 1930, when the last flock did not pass over Cumdivock until 4-50 p.m. at least thirty-five minutes later than the average time of flight. Misty or foggy weather, while it delayed the birds, was not noticed to affect their line of flight.

As the Rooks and Jackdaws pass over on their evening flight, in a long straggling line, flocks of Common Gulls (*Larus c. conus*) often in V-formation, cross the line of flight on their way north to the waters of the Solway Firth. At the same time flocks of Starlings (*Sturnus v. vulgaris*), travelling rapidly and in dense clouds, pass eastwards to their

main winter roost that for the past three years has been in a wood in the neighbourhood of Southwaite. While the Rook and Jackdaws keep to the same winter roost, Starlings frequently change their roost after several winters' occupation. Moreover, during the autumn months they will frequent two or more roosts in young plantations or shrubberies before settling down to a permanent winter roost. Interference by man may account for this behaviour of Starlings. Also the non-breeding Starlings will continue to frequent their roost during the summer months and by half-past seven on a June evening flocks have been observed travelling eastwards to their roost in the Southwaite neighbourhood.

The same conditions have been noticed as regards the morning flights of these species with the various flocks of course travelling in the reverse directions.

On January 18th and January 30th, 1929, a pair of Rooks roosted beside their nest in the Gill rookery; also on January 17th, 1930, a pair roosted beside their nest in the same rookery. No other occurrences of this sort have been noticed on the part of the Rook, but as regards the Starling several instances have been noted of single birds or pairs or exceptionally small parties roosting by themselves.

During August and September, and occasionally prolonged into November, flocks of Rooks and Jackdaws perform a spectacular aerial performance when the birds soar to a considerable altitude, then fall headlong through the air with gurgling cries of delight. The whole display is accompanied by much cawing and chacking, and immature Rooks with feathered faces take part in it. Also characteristic of this season is the habit of a party of Rooks, whilst perched in a tree, to utter gurgling cries of delight, often accompanied by audible clicking of their mandibles.

The birds visit their nesting rookeries each month, but least attention is paid in July and August. From mid-September onwards, however, and especially on balmy sunny days, they spend a good deal of time about the nest-trees, and much excitement prevails. In addition to the noisy cawings and frequent bowings and fantailings that take place at or near the nests, in some cases followed by the hens brooding on the nests, parties of two to five or six birds will follow each other in single file about the nest-trees in the 'slow-motion' courtship-flight, in which the birds use a slower and more exaggerated wing-beat than is the case in the normal flight. Only rarely are any immature Rooks noticed at the nesting rookeries, whilst very few are seen at any time with the feeding flocks in the grass-fields. In the late spring occasional small flocks of immature birds have been noted feeding by themselves. Thus on March 25th, 1931, a flock

of twenty-five was noted, and on April 28th, 1935, one of thirty-seven was feeding in a grass-field two miles distant from the Gill rookery.

On October 15th, 1939, a pair of Rooks were in a grass-field about one mile distant from the Crofton rookery. They faced each other with fluttering wings and fan-spread tails, and after bowing to each other with beak-tips touching, the hen elevated her tail, whereupon the cock mounted her and copulated. On November 20th, 1938, in the Gill rookery, a pair alighted together on the branch of a nest-tree: the hen fluttered her wings, then elevated her tail as if desiring coition, but the cock did not comply. In the Carden rookery at 8-30 a.m. on December 9th, 1936, two birds were noted some distance apart in the same tree. The hen fluttered her wings and elevated her tail, whereupon the cock flew to her and copulated. After a short interval the hen flew to a neighbouring tree holding a nest, broke off a twig from a branch and laid it on the rim of the nest. On December 23rd, 1935, two Rooks were in a grass-field equidistant between the Carden and Gill rookeries. The hen, on the near approach of the cock, fluttered her wings and opened wide her bill; the cock mounted her and copulated.

On November 7th, 1936, two Jackdaws, members of a flock of Rooks and Jackdaws that were feeding in a grass-field, copulated after a short struggle, whereupon the Rooks in the immediate vicinity cawed vociferously.

On January 26th, 1930, two Starlings were perched side by side on the branch of an ash tree. Suddenly the cock mounted the hen and copulated. Again, on February 28th, 1930, a Starling copulated with another when perched on a tree-branch.

The feeding of the hen Rook by the cock has been noticed as early as December 28th, and from then onwards many occurrences have been noted, with a maximum in the month of March.

Nest-building or nest-repairing is not usual before late February, while the break-up of the winter roost seldom occurs much earlier than mid-March. As the birds begin to lay, so they begin roosting at the nesting rookeries, the hen on the nest, the cock usually on an adjoining tree branch by the nest. On March 10th, 1930, the Crofton rookery was watched until 6-45 p.m. Many parties and small flocks kept departing for the winter roost until close on dusk, but several dozens of birds stayed at the rookery, the hens on the nests, the cocks roosting in the branches nearby. On March 15th, 1937, the Carden rookery was watched until 7 p.m., but all the birds drifted away in pairs or small parties to the winter roost except for one pair who stayed the night; two nights

later nine pairs stayed. The behaviour of the nesting birds at Gill rookery was noted during March, 1936. On March 5th the birds were busy nest-building, but from 5-50 p.m. until 6-20 p.m. they began to leave their nests in pairs or small parties for the winter roost, and none stayed the night. The same procedure occurred on March 8th, but on the 12th one pair stayed the night, followed by five pairs on the 14th.

A feature of these nesting rookeries is the late nesting of several pairs. Thus at the Gill rookery in 1932, four pairs did not begin building until March 26th, and the first of these four nests did not hold any eggs until April 7th, when most of the other nests in the rookery held young. Again, in 1936 at the same rookery, four pairs did not begin building until March 22nd, two other pairs on April 3rd, and a seventh pair on April 6th.

At the end of the nesting season the adults and young roost in hedgerow trees within a half-mile radius of the nesting rookery. On June 23rd, 1937, they were roosting in such trees by 7 p.m.

On December 16th, 1930, six Jackdaws alighted outside the holes in a built-up quarry face where they bred. The birds were in pairs, and chacked a lot among themselves. Finally one bird went inside a nesting-hole. On February 22nd, 1931, nine Jackdaws spent part of the morning about this quarry face, chacking and paying visits to the nesting-holes. On January 16th, 1935, the weather at the time being very mild and balmy, a pair of Jackdaws were watched carrying nesting-sticks into a disused chimney.

In 1939 Jackdaws continued passing over Cumdivock to the winter roost until April 10th, when a flock of twenty-four passed over at 7 p.m.

In 1930 Rooks were breeding in stag-herded beech trees near Anthorn: one such tree held nineteen nests.

Throughout the autumn and winter months Rooks and Jackdaws feed commonly in the grass-fields, frequently by themselves or accompanied by flocks of Starlings or occasionally Lapwings (*Vanellas v. vanellas*) and Common Gulls. In September they frequent the stubble-fields, and in October and early November follow the oak trees in the hedges for acorns, but the grass-fields are their principal feeding-grounds. Even in the spring, with young to feed, they hunt mainly in the grass-fields for food and only sparingly follow the plough or the harrows. In this neighbourhood the Common Gull is the 'bird of the plough.' As long as the weather remains mild and open they apparently find a sufficiency of food in these grass-fields, but should a prolonged spell of frost or snow set in it is a puzzle how these birds find sufficient to eat. They then frequent the poultry-runs and the cattle and sheep

troughs in the fields, and will attack with their bills the growing turnips in the fields, while any sealed dung is eagerly examined for insect life ; but with the short day, little more than eight hours, that exists in December and early January, during which to search for food, it is not surprising if many birds go half-hungred to their nightly roost.

FUNGI OF THE CAWTHORNE DISTRICT

WILLIS G. BRAMLEY, JENNIE GRAINGER, AND JOHN GRAINGER

THE woods round Cawthorne and Bretton provided a good war-time setting for the Annual Foray of the Mycological Committee of the Union, from September 27th to October 1st. Oak and Birch dominate the woodland with a proportion of Beech in the Bretton Woods. Soils in the woodland are usually moderately acid, about pH 5.5, and numerous species growing on the ground were collected. The common Stinkhorn was very abundant under these conditions, and it should be noted that this species appears to be cosmopolitan in its requirements for soil acidity ; it has been found growing just as freely in neutral soils.

The pastures were found to be neutral, a fact which made the common mushroom, *Psalliota campestris*, plentiful enough to provide a supply of food.

Some widely distributed species were conspicuous by their absence. Although soil acidity was suitable for the growth of *Morchella deliciosa* Fr., this species was not found, nor where *Puccinia obtegens* (= *Suaveolens*) on the field thistle, *P. violæ* on violets, and *Rhytisma acerina* upon sycamore, though all the host plants were plentiful. It was also noteworthy that all the fructifications of *Polyporus betulinus* were found on dead Beech trees. This species can attack the living host and fructify thereon, but although the living Birch trees were plentiful, the fructifications did not appear. It might also be significant that all the wild crab apples found in one locality were quite free from the Apple Scab fungus, *Venturia inæqualis*, though cultivated apples in the vicinity were subject to this parasite. The Jew's Ear, *Auricularia auricula-Judæ*, was not found at Cawthorne, though its host was common and it was found at Silkstone.

We desire to express our thanks to Mr. A. A. Pearson and Miss E. M. Wakefield for naming several species, and to Mr. W. D. Hincks for help, entomological and otherwise, during the Foray.

* New to S.W. V.C. 63

† New to Yorkshire.

‡ New to Britain.

MYXOMYCETES

Psysarum viride Pers.

Fuligo septica Gmel.

Stemonitis fusca Roth.

S. ferruginea Ehrenb.

Comatricha nigra Schroet.

Cribraria rufa Rost.

Reticularia lycoperdon Bull.

Lycogala epidendrum Fr.

Trichia varia Pers.

T. botrytis Pers.

Arcyria denudata Sheld.

A. nutans Grev.

Perichæna corticalis Rost.

* *Diderma hemisphericum* Hornem.

Plasmodiophora brassicæ Woron.,
on White Turnip.

PHYCOMYCETES

Peronospora grisea Unger., on *Veronica beccabunga*.

P. parasitica (Pers.) Tul., on *Capsella bursa-pastoris*.

Pilobolus crystallinus (Wigg.) Tode.

ASCOMYCETES

- Sphærotheca pannosa* (Wallr.) Lev.
on Rose.
- Erysiphe polygoni* D.C. on Hera-
cleum, Taraxacum, Myosotis,
etc.
- Lachnea scutellata* (Linn.) Gillet.
- Ascobolus stercorarius* (Bull.)
Schroel. (= *furfuraceus* Pers.).
- Ascophanus carneus* (Pers.) Boud.
- Coryne sarcoides* (Jacq.) Tul.
- Bulgaria inquinans* (Pers.) Fr.
- Orbilia xanthostigma* Fr.
- **Helotium virgultorum* (Wahl.)
Karst.
- Belonidium pruinosum* Mass.
- Nectria cinnabarina* (Tode.) Fr.
- Hypomyces aurantius* (Pers.) Tul.
The yellow variety was also
found in addition to the typical
form.
- **Hypocrea gelatinosa* (Tode.) Fr.
- **H. pulvinata* Fckl.
- Claviceps purpurea* (Fr.) Tul.
- Cordyceps militaris* (Linn.) Link.
- Trichosphaeria minima* (Fckl.)
Went.
- Leptospora spermoides* (Hoffm.)
Fckl.
- L. ovina* (Pers.) Fckl.
- **Lasiosphaeria hirsuta* (Fr.) Ces. et
de Not.
- Chaetosphaeria phæostroma* (Mont.)
Fckl.
- **Zignoella ovoidea* (Fr.) Sacc.
- **Nitschkia tristis* Pers.
Valsa sp. on Sycamore and Beech.
- **V. cureyi* Nits. (not in Catalogue,
but see Nat., 1941, p. 228).
- **Diaporthe taleola* (Fr.) Sacc. on
Oak.
- **Cryptospora suffusa* (Fr.) Tul., on
Alder.
- Melanconis stilbostoma* (Fr.) Tul.
on Birch.
- Diatrype stigma* (Hoffm.) Fr.
- **D. disciformis* (Hoffm.) de Not.
- **Quaternaria dissepta* (Fr.) Tul. on
Elm.
- **Diatrypella verruciformis* (Ehr.)
Nits. (= *tocciacana* de Not.) on
Alder.
- Daldinia concentrica* (Bolt.) Ces.
et de Not.
- Hypoxylon multifforme* Fr.
- Xylaria hypoxylon* (Linn.) Fr.
(conidia and ascophores).
- **Eutypella sorbi* (Schmidt. Fr.)
Sacc. (not in Yorks. Catalogue
but now recorded for V.C. 62
and 64 also).

BASIDIOMYCETES

- Sphacelotheca hydropiperis* (Schun.) De B., on *Polygonum hydropiper*.
- Urocystis anemones* (Pers.) West, on *Ranunculus repens*.
- Pucciniastrum pustulatum* Diet., II, III, on *Epilobium angustifolium*.
- Uromyces valeriana* (Schum.) Fckl., II, III, on *V. officinale*.
- U. trifolii* Lev., II, III, on *Trifolium pratense*.
- U. rumicis* (Schum.) Wint., II, III, on *Rumex* sp.
- U. polygoni* (Pers.) Fckl., II, III, on *P. aviculare*.
- Puccinia centaureæ* D.C., II, III, on *C. nigra*.
- P. cirsii* Lasch., II, III, on *C. palustre* and *C. lanceolatum*.
- P. leontodontis* Jacky, II, III, on *L. hispidus* and *L. autumnalis*.
- P. menthæ* Pers., II, III, on *M. viridis*.
- P. malvacearum* Mont., III, on *M. sylvestris*.
- P. graminis* Pers., II, III, on oats.
- P. lolii* Niels., II, on Holcus.
- P. poarum* Niels., OI, on Tussilago.
- P. baryi* Wint., II, on Brachypodium.
- P. arrhenatheri* Erikss., II, on *A. elatior*.
- Uredo airæ*, on *Deschampsia cæspitosa*.

AGARICALES

- Amanita phalloides* (Vaill.) Fr.
- A. rubescens* (Pers.) Fr.
- A. muscaria* (L.) Fr.
- Amanitopsis fulva* (Schæff.) W. G.
Sm.
- Lepiota granulosa* (Batsch.) Fr.
- Armillaria mellea* (Vahl.) Fr.
- Tricholoma rutilans* (Schæff.) Fr.
- Russula nigricans* (Bull.) Fr.
- R. cyanoxantha* (Schæff.) Fr.

AGARICALES—continued

- Russula ochroleuca* (Pers.) Fr.
R. emetica (Schæff.) Fr.
R. atropurpurea (Krombh.) Maire.
R. puellaris Fr.
Russula nitida (Pers.) Fr.
R. ochracea (A. et S.) Fr.
† *R. velenovskii* (Melzer.) Svara.
(det. A.A.P.).
Mycena rugosa Fr.
M. galericulata (Scop.) Fr.
M. polygramma (Bull.) Fr.
M. inclinata Fr.
M. alcalina Fr.
M. sanguinolenta (A. et S.) Fr.
M. galopus (Pers.) Fr.
M. epipterygia (Scop.) Fr.
Collybia radicata (Relh.) Berk.
C. platyphylla (Pers.) Fr.
Collybia maculata (A. et S.) Fr.
C. butyracea (Fr.) Bull.
C. velutipes (Curt.) Fr.
C. acervata Fr.
Marasmius peronatus (Bolt.) Fr.
M. erythropus (Pers.) Fr.
M. dryophilus (Bull.) Karst.
Androsaceus rotula (Scop.) Pat.
A. androsaceus (Linn.) Pat.
Lactarius turpis (Weinm.) Fr.
L. velleus Fr.
L. quietus Fr.
L. vietus Fr.
L. rufus (Scop.) Fr.
L. subdulcis (Pers.) Fr.
Hygrophorus eburneus (Bull.) Fr.
H. pratensis (Pers.) Fr.
H. virgineus (Wulf.) Fr.
H. niveus (Scop.) Fr.
H. ceraceus (Wulf.) Fr.
H. miniatus Fr.
H. calyptræformis Berk.
H. chlorophanus Fr.
H. psittacinus (Schæff.) Fr.
H. blennius Fr.
Laccaria laccata (Scop.) B. et Br.
Omphalia fibula (Bull.) Fr.
Pleurotus ostreatus (Jacq.) Fr.
- *Pleurotus atrocæruleus* Fr.
Panus torulosus (Pers.) Fr.
Pluteus cervinus (Schæff.) Fr.
Entoloma porphyrophæum Fr.
Nolanea proletaria Fr.
Leptonia sericella (Fr.) Quel.
Pholiota spectabilis Fr.
P. mutabilis (Schæff.) Fr.
P. erebia Fr.
Pholiota aurea (Mattusch.) Fr.
Inocybe laceva Fr. (det. A.A.P.).
Tubaria furfuracea (Pers.) W. G. Sm.
T. inquilina (Fr.) W. G. Sm.
**Flammula gummosa* (Lasch.) Fr.
F. sapinea Fr.
Crepidotus mollis (Schæff.) Fr.
Psalliota campestris (Linn.) Fr.
Stropharia æruginosa (Curt.) Fr.
S. semiglobata (Batsch.) Fr.
S. merdaria Fr.
Annelaria separata (Linn.) Karst.
Hypholoma sublateritium (Schæff.) Fr.
H. fasciculare (Huds.) Fr.
H. velutinum (Pers.) Fr.
H. hydrophilum (Bull.) Fr.
Panæolus papilionaceus (Bull.) Fr.
**Psathyra gossypina* (Bull.) Fr.
Psilocybe semilanceata (Pers.) Fr.
P. fæniseccii (Pers.) Fr.
Coprinus atramentarius (Bull.) Fr.
C. micaceus (Bull.) Fr.
C. radiatus (Bolt.) Fr.
C. plicatilis (Curt.) Fr.
Paxillus involutus (Batsch.) Fr.
Tylopilus felleus (Bull.) Karst.
Strobilomyces strobilaceus (Scop.) Berk.
Boletus elegans (Schum.) Fr.
B. chrysenteron (Bull.) Fr.
B. subtomentosus (Linn.) Fr.
B. erythropus (Pers.) Quel.
B. scaber (Bull.) Fr.

APHYLLOPHORALES

- Polyporus squamosus* (Huds.) Fr.
P. sulphureus (Bull.) Fr.
P. giganteus (Pers.) Fr.
P. betulinus (Bull.) Fr.
P. dryadeus (Pers.) Fr.
P. hispidus (Bull.) Fr.
**P. rutilans* (Pers.) Fr. (det. A.A.P.).
P. radiatus (Sow.) Fr.
P. adustus (Willd.) Fr.
P. cæsius (Schröd.) Fr.
- Polystictus versicolor* (Linn.) Fr.
Lenzites betulina (L.) Fr. (det. A.A.P.).
**Trametes gibbosa* (Pers.) Fr. (det. A.A.P.).
T. mollis (Sommerf.) Fr.
Dædalea biennis (Bull.) Quel. (det. A.A.P.).
**Merulius tremellosus* (Schröd.) Fr.
**M. rufus* (Pers.) Fr. (det. A.A.P.).
Phlebia merismoides Fr.

APHYLLOPHORALES—continued

- Coniophora arida* Fr.
C. puteana (Schum.) Karst.
Fistulina hepatica (Huds.) Fr.
Mycleptodon fimbriatum (Pers.) Bourd.
Radulum orbiculare Fr. (det. A.A.P.).
Acia uda (Fr.) B. and G.
**Grandinia farinacea* (Pers.) B. and G. var. *acredia* (det. A.A.P.).
Stereum hirsutum (Willd.) Fr.
**Corticium subcostatum* (Karst.) B. and G.
C. arachnoideum Berk. (det. A.A.P.).
C. sambuci (Pers.) Fr. (det. A.A.P.).
C. confluens Fr.
C. sphæropocum (R. Maire.) von H. and L. (= *Hypochnus sphærosporus* R. Maire (det. A.A.P.).
Corticium. (Gloes.) *albostramineum* (Bres.) B. and G. (det. A.A.P.).
**C. lividum* (Pers.) Fr. (det. E.M.W.).
† *Peniophora leprosa* B. and G. (det. E.M.W.).
‡ *P. filamentosa* (Berk. and Curtin) Burt. (det. E.M.W.).
Peniophora lævigata (Fr.) Mass. (det. E.M.W.).
**P. setigera* (Fr.) Bres.
P. cinerea (Fr.) Olse.
Cyphella capula (Holmsk) Fr.
Clavaria corniculata (Schæff.) Fr. var. *pratensis* Fr. (Cotton and Wakefield).
C. leuteo-alba Rea
C. inæqualis (Mull.) Quel.
C. dissipabilis Britzl.
C. vermicularis Fr.

CALOCERALES

- Calocera viscosa* (Pers.) Fr.
C. stricta Fr.
Calocera cornea (Batsch.) Fr.

GASTEROMYCETALES

- Phallus impudicus* (Linn.) Pers.
Lycoperdon perlatum Pers.
L. pyriformi (Schæff.) Pers.
Bovista plumbea Fr.
Scleroderma aurantium Pers.
S. verrucosum (Vaill.) Pers.
Sphaerobolus stellatus (Tode) Pers.

FUNGI IMPERFECTI

- *Colletotrichum Liliacearum* (West.) Dulse on Bluebell stems.
Oidium monilioides Link.
Trichoderma lignorum (Tode) Harz.
Sepedonium chrysospermum (Bull.) Fr.
Stilbella erythrocephala (Ditm.) Lind.
Ægerita candida Pers.

The following species were collected from the Silkstone area (W.G.B.) :

Ustilago Hordei (Pers.) K. and S.
Auricularia auricula-Judae (Linn.) Schroet.
Diaporthe leiphæmia (Fr.) Sacc.
Diatrypella quercina (Pers.) Nits.

YORKSHIRE NAURALISTS' UNION: BOTANICAL SECTION

THE Annual Meeting of this section was held in the Botany Common Rooms, Leeds University, on October 5th, when the various officers and members of the Committee were nominated for election by the General Committee of the Union.

The sectional reports were discussed and adopted, and Prof. Priestley gave a resume of some observations by Prof. Walton on the behaviour of antheridia after discharge under water. Prof. and Mrs. Priestley afterwards entertained the members to a welcome cup of tea.

The NATURALIST

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PRINCIPALLY FOR THE NORTH OF ENGLAND

Edited by

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with the assistance as referees in special departments of

J. M. Brown, B.Sc., F.R.E.S.

W. H. Burrell, F.L.S.

Chris A. Cheetham, F.R.E.S.

Ralph Chislett, F.R.P.S., M.B.O.U.

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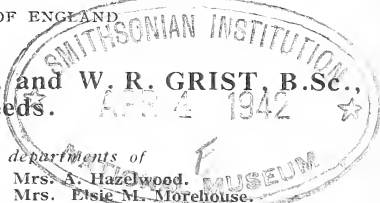
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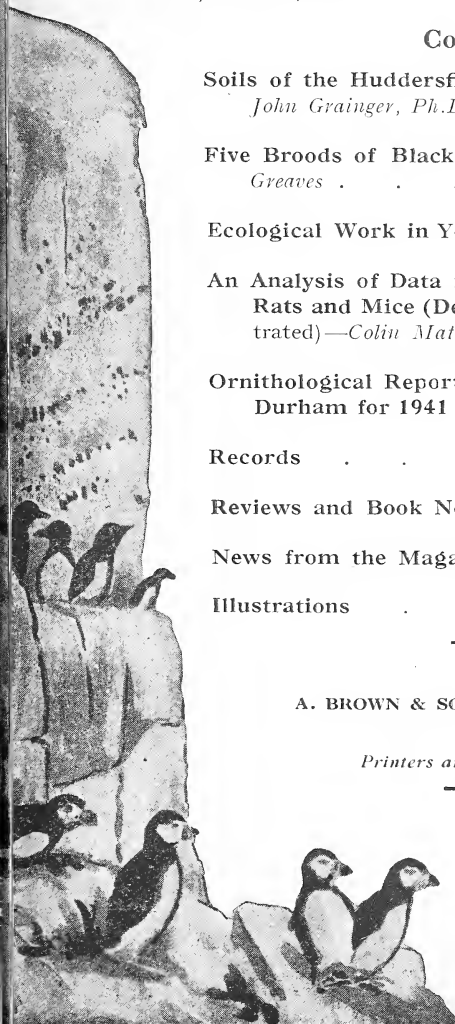
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The constitution consists of the President, Treasurer, and Secretary of the Union, and the Chairman of each of the Sections and Committees, and the Divisional Secretaries.

A FURTHER meeting of this Committee and all interested in **ECOLOGY** will be held at LEEDS UNIVERSITY in the BOTANY COMMON ROOM (Beech Grove Terrace) on Saturday, March 21st, 1942, at 3-30 p.m., to decide on the type of country for a systematic study by all sections of the Union. Will all those interested please consider the article by Prof. Pearsall in this issue of *The Naturalist* and see which proposal will be most suitable to them.—C.A.C.

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SOILS OF THE HUDDERSFIELD DISTRICT

JOHN GRAINGER, PH.D., B.Sc.

THE district which provides the setting for this survey is a purely arbitrary region surrounding the town of Huddersfield. It is in some respects my Curatorial territory within which objects for the museum may be obtained freely by gift or persuasion, and it is the local district which the Tolson Memorial Museum interprets for the educational benefit of the people who live here. The principles of soil distribution and agricultural reaction are, however, typical of a large stretch of the eastern slopes of the Pennines in Yorkshire, and the transect which includes the Huddersfield district embraces a set of conditions which vary within unusually wide limits for the size of the area.

Rocks from the Millstone Grits and the Coal Measures provide the architecture of the district. Altitude varies from less than 100 ft. above sea-level at Dewsbury to over 1,900 ft. at Black Hill, south-west of Holmfirth. Most of the ground above a thousand feet is covered by peat. The higher spurs between about 800 and 1,000 ft. are fundamentally heather moor in which the dominant plant under natural conditions is Ling, *Calluna vulgaris*. The lower parts are mostly devoted to grazing in times of peace, but such cultivation as exists shows two types, namely, upland cultivation with oats and lowland cultivation with wheat. There are also scattered pieces of woodland. General features of this distribution are shown in Fig. 1.

NATURAL CONDITIONS AND HUMAN IMPROVEMENTS

Soil is, perhaps, the most complex raw material used by the human race, and its variability is only equalled by that of the weather and the vagaries of politics. It has, however, none of the occasionally feminine quality of caprice; its complexity is laid upon a framework of general principles, and its variability can be defeated by measurements interpreted with understanding.

A study of the peace-time distribution of arable land in the Huddersfield district is illuminating (Fig. 2). This shows that the highest percentages of arable land are on Honley Moor and Crosland Moor, two exposed parts of the district which are naturally areas of poor soil and revert to unproductive heather moor with the least relaxation of agricultural discipline. This introduces one of the primary aims of any soil survey, namely, to show that land can be made productive very largely at the will of the cultivator. Man can build a noble edifice of agriculture upon the poorest foundations if only the system of husbandry is adapted to



Figure 1

his particular conditions. A soil survey should indicate some of the conditions.

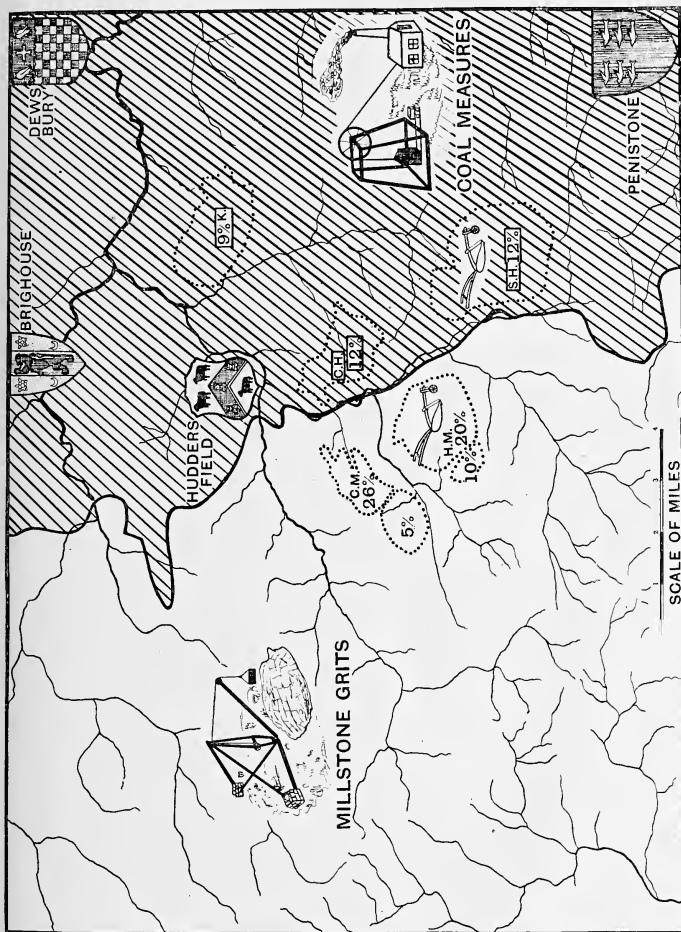


Figure 2

Regions with the highest peace-time percentages of arable land. The highest percentages of all are Crosland Moor (C.M.) and Honley Moor (H.M.), on soils which are not naturally as fertile as those of the Coal Measures (shaded). C.H. = Castle Hill plateau. K. = Kirkheaton district. S.H. = Storth's Hall plateau.

FACTORS WHICH INFLUENCE SOIL CONDITIONS

Though all soils are derived from rock, their present condition is due to several factors, and in the district under survey it is primarily necessary to consider the kind of rock from which the soil was weathered, and the geological history of the district.

MILLSTONE GRIT AND COAL MEASURE SOILS.

An outstanding difference in fertility is found between the soils formed from the Millstone Grit rocks and those derived

from the Coal Measures. Fig. 2 shows the bare facts of a distribution whose agricultural results have impressed many

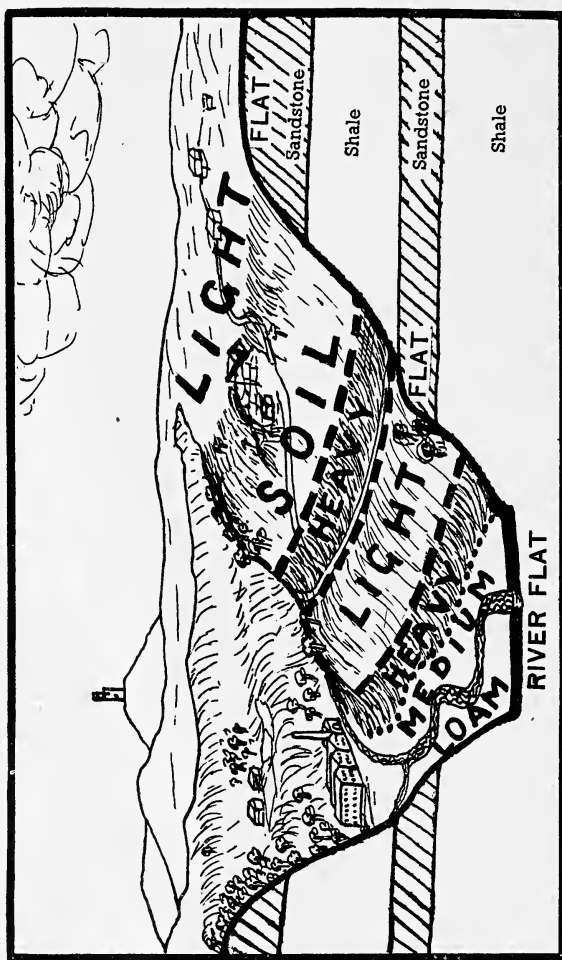


Figure 3 [By courtesy of Huddersfield Examiner]
A diagram to illustrate the distribution of local soils.

visitors, and must be even more obvious to the native. The caustic comment of one libellous incomer that it took two beasts from a Millstone Grit farm to cast a shadow can, of course, be repudiated with vigour. There is, nevertheless, a lower level of agricultural and horticultural production on the Millstone Grits, which cannot be entirely explained by its more mountainous setting.

ALTERNATING BANDS OF HEAVY AND LIGHT SOIL.

The second difference in soil conditions is one of fatigue in working rather than of fertility. The whole district, both Millstone Grits and Coal Measures, owes its scenery to the modification of alternating layers of hard sandstone rock and softer shale by the intersection of valleys. Sandstone rocks weather to a light, sandy soil, whilst shales break down to heavier clay. The layers are exposed on the valley sides,

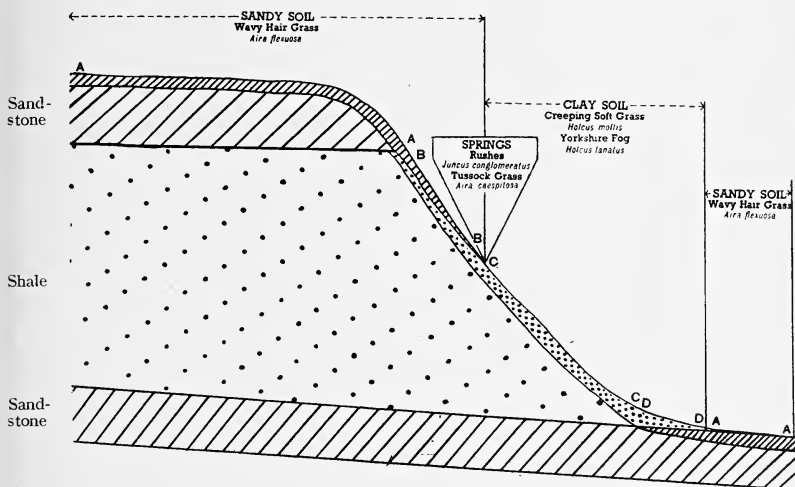


Figure 4

Diagram to show the principles of soil distribution on the edge of a terrace, with the naturally-growing plants typical of each kind of soil. The letters A, B, C, and D refer to drainage conditions (see section on Climatic conditions in a later instalment).

where the weathering of previous ages has left a series of flats or terraces, where the hard sandstones are exposed, and steeper places, where the softer shales have been more strongly eroded. Sandy soil formed at the edge of a terrace, however, falls down the slope below, and the heavy soil formed on the shaly slope accumulates at the bottom.

Fig. 3 shows how this would appear in a section of the huge multi-layered sandwich which forms this district. The flat terraces and the upper parts of a slope have sandy soil, and the lower parts of a slope have clay soil. Sandy soils fatigue the digger, and clay land fatigues him more.

Fig. 4 shows the matter in somewhat greater detail, and introduces another indication of the type of soil, namely the natural vegetation. Wavy Hair-grass, *Aira flexuosa*, favours the sandy soil, whilst Creeping Soft-grass, *Holcus mollis*, or Yorkshire Fog, *H. lanatus*, grow upon the clay soils. The

junction between sandy soil and clay soil is often marked by a line of springs, or may be badly drained. It is usually shown in the field by the growth of Rushes, *Juncus conglomeratus*, Tussock grass, *Aira caespitosa*, and Sedges, though this feature depends upon the dip of the layers of sandstone and shale at right angles to the valley. If they dip towards the valley, the junction will be moist or springs may appear ; if the dip is away from the valley, it leaves the side dry.

A LEGACY FROM THE PAST.

The lower parts of the district appear to have been covered, during the Ice Age of the remote past, by a lake (Fig. 5) formed by the huge Vale of York glacier interrupting the drainage of the River Calder at Horbury, near Wakefield. A lateral moraine of this glacier held back the drainage to a height of 400 ft. above sea-level. Some hardy geologists with a passion for microscopic exactitude claim that it was 405 ft. above sea-level. This barrier was but temporary in geological time, though it lasted for a few thousand years or so, and was thereby responsible for the deposition of a considerable amount of sediment. The deposits are extremely variable and often yield fertile, loamy soils, but heavy clay soils predominate. Clays of varying colour, from blue, yellow and brown to light grey or almost white, are found. Excavations for buildings in the lower part of the town of Huddersfield often reveal this glacial clay for depths of 20 ft. or even more. Patches of gravel or sand occasionally occur amongst this heavy soil, the most notable being at Kirklees Park, Dalton, Waterloo, and near Elland railway station. Details of the extent of this lake deposit can be obtained by tracing the 400 ft. contour line upon an Ordnance map of the district.

THE MELLOWING ACTION OF RIVERS.

The flat bottoms of the valleys are caused by river action over a long period. This produces alluvial soil (Fig. 3) which is never of extreme type, and is usually a medium loam. It can usually be worked with relative ease, and is often the most naturally fertile type in the district. A flood-plain or river flat usually gives ocular demonstration of its extent. It is rarely technically flat, but is usually in marked contrast with the banks of rising ground at its margin. The principal alluvial deposits are, moreover, marked upon the Drift edition of the 1-in. Geological Survey map (Sheet 77).

A PLANT-FORMED SOIL.

The peat lands which cover most of the district higher

than 1,000 ft. above sea-level, have been formed from partly decayed plant material, accumulating during the last 4,000 years. Peat-forming plants are able to continue growth

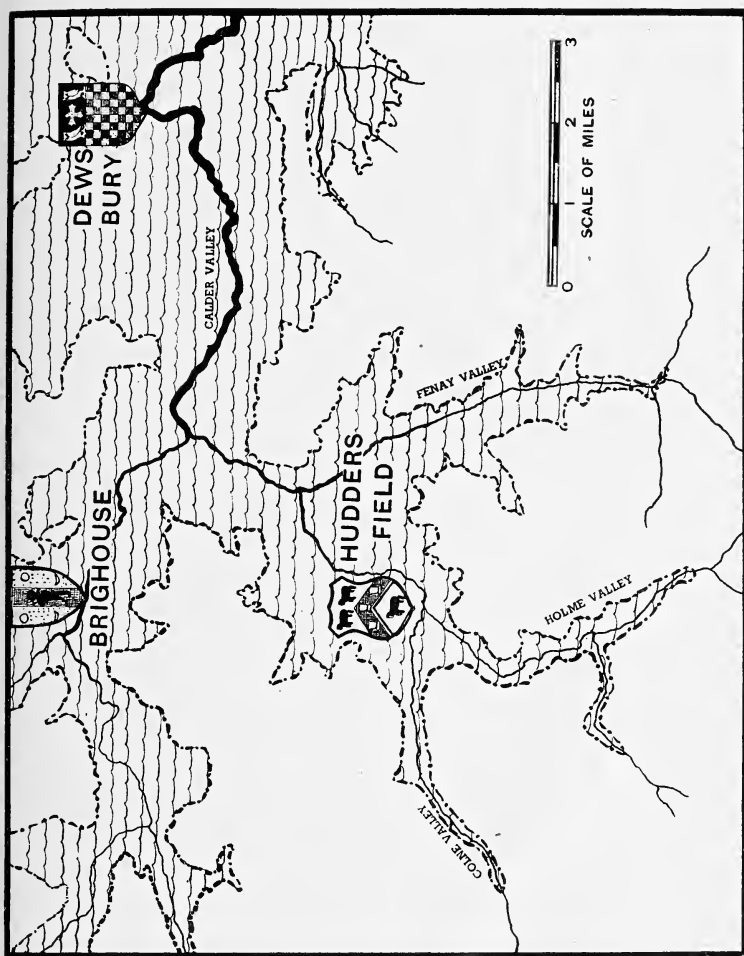


Figure 5 [By courtesy of Huddersfield Examiner]
Extent of a former glacial lake in the Huddersfield area. Soils comprising the former lake bed (shaded) are usually heavy, and under natural conditions are neutral or even slightly alkaline.

from the top, even while the base decays, and the resulting material is therefore almost entirely organic matter. Such a deposit has little direct use in agriculture, and the peat lands provide sustenance for only a relatively small number of hardy Lonk sheep. Peat itself, however, has a use in garden composts.

The various kinds of soil in the Huddersfield district might therefore be summarised as follows :

	<i>Type.</i>
1. Millstone Grit sandstone . . .	Sandy.
2. Millstone Grit shale . . .	Clay.
3. Coal Measure sandstone . . .	Sandy.
4. Coal Measure shale . . .	Clay.
5. Glacial soils ; the deposits from a former glacial lake. . . .	Variable, but usually heavy clay.
6. Alluvial soils ; valley deposits made or altered by river action	Medium loam.
7. Peat	Organic.

(To be continued)

FIVE BROODS OF BLACKBIRDS IN ONE NEST

WALTER GREAVES

A PAIR of Blackbirds returned to my garden in spring, 1941, and reared three broods in a nest on the top bar of the trellis work fastened to a wall to support a climbing rose tree (Dr. Van Fleet).

It is assumed that these were the birds which reared two broods of young in this nest in 1940, and two in a nest in the very same spot in 1939 (see *The Naturalist*, 1940, pages 235-6). The cock is undoubtedly the same, and good ground exists for believing the hen to be his faithful companion and mate of three successive summers. In her case recognition rests more upon circumstances than upon any particular mark which she carries.

This summer's thrice-used nest survived the winter on account of its sheltered situation. The 1939 nest was pulled down after the birds had done with it.

The first happening belongs to the 1940 rather than to the 1941 season, or perhaps it has no significance in either case. Anyhow, in the middle of September, 1940, the hen bird, which had vanished with the cock when the last brood of young left, paid a visit just before dusk each day for close upon a fortnight. She kept such good time that it was almost possible to guess correctly the hour and the minutes whenever she appeared. She took up a position on an 8 ft. high screen from which she could see the nest, which she generally faced, and for several minutes poured out a perfect volley of loud, metallic chatter, by which she attracted a great deal of attention to herself. These visits ceased about the end of the month (September) and for close on five months no Blackbird was seen about the place. The cause for the behaviour described

was never ascertained. Selous, in his *Bird Life Glimpses*, alludes to a similar medley of notes by Blackbirds before roosting.

The first indication that the Blackbirds had any interest in the nesting situation they had used in 1939 and 1940 was conveyed by a cock which sang on February 27th, 1941. Between then until the end of March little was seen of Blackbirds, but on April 2nd and 3rd the hen had begun carrying material to the well-preserved nest. The little repair, which consisted only of a few fresh lining straws, was carried out entirely by her. Six days later (9th) the first egg was laid. The nest contained three eggs on the 11th, the third egg being deposited some time after noon. At 11 a.m. on the 12th the nest had still three eggs, but when the hen came off at 12-25 p.m. (noon) the fourth egg, the extent of the clutch, had been laid.

The young began to hatch on April 24th. They were all in the eggs at noon, but at 7-30 p.m. two had emerged. An egg was still visible at 9-30 a.m. on April 25th, but 1½ hours later all four eggs had hatched. No unusual kind of food seemed to be fed to the young during their development. As far as could be seen their diet was mainly earthworms. They made rapid progress. On May 5th they were feathered and completely filled the cup, two days later one ventured out, and on May 9th all had gone. On that day, one, and possibly both parents, went up to the nest, then empty. The following day (May 10th) the hen bird was definitely recognised at the nest. Tragedy overtook the family party on the 11th, when the most backward young one was decapitated by a Magpie, which was seen scouting round on several occasions and may have accounted for other youngsters.

Exactly one week (May 16th) after the first brood had left the nest, the first egg of the second clutch was laid. Little if anything had been done to the nest in the meantime, but it had been left beautifully clean. The clutch of four had been completed by May 19th, and three eggs had hatched at 11 a.m. on May 31st. One egg was addled. The nest, which had not been inspected on the 30th, contained eggs only at noon on May 29th.

On June 5th the old cock was seen to have lost his tail. The second brood of young left the nest late at night on June 13th.

Preparations for the third nest were in operation on June 18th, the hen going up to it and spending some time there. She was watched in the act of relining on June 19th. On the morning of the 20th she was sitting on the nest, and on leaving at 10-50 it was found that the first egg of the last clutch had been laid. The second egg followed after an interval of one

day (on the 22nd), and the third a day later. No inspection was made on the three following days, but the nest had five eggs on June 27th.

The old cock had grown a full tail by July 5th. He was still busily feeding young that by now were 35 days old, and had been out of the nest 22 days. These young birds seemed to have no clear idea of what was, and was not, food. They hopped about the garden path and among the growing plants, picking up objects and dropping them again after trying them in their beaks for a second or two.

The attempted effort to produce a third brood was largely a failure. Only one egg out of five hatched a bird (on July 9th), but the old hen sat on, seemingly expectantly until July 22nd, when the young bird left the nest and took up a position on the top bar of the trellis, where it remained for a day. Unmistakable efforts to coax it farther away were made by the parents, and on July 23rd the last act in the interesting drama which commenced on April 2nd was completed. The forlorn young one went away and was never seen again. The old birds, too, completely deserted the garden. Four eggs were left in the nest. Externally they were perfectly sound. Not a bulge, or even a scratch, was visible, and this after the hen bird had sat on them 30 days.

Immediately the young left the nest the responsibility for their welfare seemed to devolve largely, if not solely, on the cock, although the nestlings had been fed by both. The hen, as stated, began to interest herself in the nest again a few days after the young had left.

The food taken up to the nest seemed less varied than that on which other young were fed in 1939 and 1940. None of the first two broods this year tasted the raspberries, which had only begun to ripen when the odd young one of the third nest had been born.

It seems quite possible that each brood could have been fed on totally different fare. The gardens round about were naturally more bountiful and varied in their produce in July than in May, and small animal life in the way of insects was more plentiful in June than in May.

All the hours alluded to were B.D.S.T.

The Entomologist's Monthly Magazine for December contains 'The Aquatic Coleoptera of East and West Sussex,' by F. Balfour Browne; 'Systematic Notes on the British Species of *Corizus* auct. (Hem. Coreidæ),' by W. E. China (with figs.); and several shorter notes.

The Entomologist's Record for December contains 'The Insect Fauna supported by the Apple and Pear Trees in Lebanon,' by A. M. S. Talhouk; 'Butterfly collecting in Wood Walton Hunts area during 1941,' by H. A. Leeds; 'Phenological Classification of Palaearctic Lepidoptera,' by A. J. Wightman; Collecting Notes; Current Notes; and Supplement 'The British Noctuae and their Varieties,' by H. J. Turner.

ECOLOGICAL WORK IN YORKSHIRE

W. H. PEARSALL

ECOLOGY, dealing with the relations between plants and animals and their environment, can be studied from various different angles. These include :

- (1) the description of communities of plants and animals (which may be called *community survey*) ;
- (2) the relation of chosen communities to their physical, chemical or biological environments ;
- (3) the relation of some particular organism to other organisms and its/their surroundings, *i.e.* its *autecology*.

The types of work included under these headings could be carried out by an organisation such as the Yorkshire Naturalists' Union in the following ways.

1. The Union is particularly fitted to prepare complete surveys of typical plant and animal communities. The vegetation unit is the easiest way of recognising such communities, and examples might be chosen from types such as (*a*) cotton grass moor, (*b*) heather moor, (*c*) oakwood (several ground flora types), (*d*) ashwood (several ground flora types).

This type of work could be done by each group or society working in a convenient centre for itself and the results for the county being pooled. Such a method would offer the great advantage of continuous recording and frequent visits, as well as the possibility of comparing similar areas in several parts of the county. The results of a careful community survey would be of great value and would be a real and unique contribution to science.

Similar studies might also be made on such relict areas as Skipwith Common, Askham Bog, Austwick Moss, Malham Tarn and Moss. They could be carried out, in part, by the Union and/or different sections meeting in the chosen area and working it intensively, after first becoming familiar with the ecological units involved. For the Union as a whole this type of study would have the disadvantage that frequent observation would be difficult.

2. The investigation of the relation between communities and their habitats would have to follow their description and seems less suitable for the Union as a whole. Doubtless individual members would become interested in it, and certainly much information would accumulate in the course of a community survey.

3. The study of autecology (and distribution problems) of a particular organism in Yorkshire might well be promoted by individual sections. It would seem to follow naturally on the results of community survey and might well be organised

round representative and common species involved in the communities studied. In this case particularly valuable results should be obtained. It would no doubt be simplest to send out questions on which information was required to individual members or affiliated societies.

It will be seen that the two main lines of work offer different degrees of interest to workers in different groups. Probably many experienced field workers have already much information of the type required, but this information has never been brought together. The point of such work is to get the information organised and available for reference. New problems will then arise and further progress will be possible.

It is necessary to point out that to get the best results care must be exercised in limiting the records to small and clearly characteristic areas. In an oak wood, for example, there are usually examples of three definite types of ground flora, dominated by either (a) bilberry, (b) silver hair grass (*Deschampsia flexuosa*), (c) soft grass (*Holcus mollis*), bluebell, and usually also bracken. The area studied in this type of wood should be limited to one or more definite types of ground flora, with oak as the predominant tree. These can easily be recognised by all. A given area should be tackled in which all the representative species cover the ground. The studied area might be made up of a sample plot (say 20 or 100 sq. metres) or of 20 (or 100) single sq. metre quadrats. The point of having a definite area is not only for precision, but also because it is necessary if workers in different parts of the county are to compare results on a comparable basis. Obviously if some work with a large area and some with a small the former may well get a more extensive group of species. Lastly, those dealing with the more rapidly moving animals will have to consider the problem of sorting them into two groups, real inhabitants and those on passage.

The ideas embodied in the preceding paragraphs follow naturally on the point of view stressed by Dr. Versey in his Presidential Address to the Union last December. They were considered in some detail at a meeting of the Committee of Suggestions for Research of the Yorkshire Naturalists' Union held in Leeds on Saturday, February 7th. The meeting was well attended and representative and it decided to recommend to the Union that the time had now come when the Union might embark on ecological work of the community survey type. It was recognised that difficulties of travelling will prevent frequent visits to any of the interesting relict areas in the county, but that it should be possible for members to work on convenient areas in their own vicinities. A further meeting is to be held to decide on suitable types of area and to discuss the organisation of the work.

AN ANALYSIS OF DATA RESULTING MAINLY FROM THE RATS AND MICE (DESTRUCTION) ACT, 1919

COLIN MATHESON, M.A., B.Sc.
Keeper of Zoology, National Museum of Wales

It was the damage done by rats and mice during the last Great War which stimulated official action against these pests and led to the passing of the Rats and Mice (Destruction) Act, 1919. The carrying out of the provisions of that Act by public authorities has resulted in the accumulation of a large body of data and statistics about rats and mice, much of which is embodied in the Annual Reports of the Medical Officers of Health of our large towns. It seems fitting and useful, now that we are in the midst of a second Great War, that some of this information should be analysed in order to find whether it provides any guidance for future procedure. The writer makes no claim that the present paper is a complete analysis of all the available data ; it is simply a presentation and discussion of a few series of figures, extending in most cases over a considerable period of years, which he has been able to assemble.

NUMBER OF RATS KNOWN TO BE KILLED ANNUALLY

It is, of course, impossible to estimate even approximately the total number of rats killed annually throughout the country. In the first place, the available figures represent mainly rats known to be killed by rat-catchers or others employed by the various public authorities—very little information is at hand regarding the numbers destroyed by private householders. In the second place, much of the rat destruction carried on by public bodies is done by laying poison baits, and one cannot say what proportion of these is effective, since the rat often does not die on or near the spot, but may manage to make its way to some inaccessible place before expiring. It may, however, be of interest to mention that the Annual Reports for 1938 of the Medical Officers of twenty-seven (mostly large) towns in Great Britain record a total of 90,031 rats known to have been killed that year. The means by which these were destroyed included traps, dogs, ferrets, fumigation, and poison baits ; while at one town payments were made to members of the public for 3,000 rats at twopence per head.¹

¹ This method may have its uses, though it recalls the following press extract : ' A rat catcher at Clerkenwell County Court yesterday, explaining why he had not yet carried out a contract, gave the following lecture to counsel : " You don't understand my business. They are offering me 6d. a tail. When I know the rats are breeding there, it doesn't pay me to go until they have bred. Then I get more " ' (*Daily Mail*, April 3rd, 1941).

Various towns, while not giving any figures for rats actually killed, record the number of poison baits laid—for example, three towns not included in the foregoing laid altogether 58,067 baits; in one of them 41,472 prepared baits were laid 'and a very large percentage taken.' As regards the types of poison used, one Medical Officer comments particularly on the 'very good results' obtained with red squill biscuits (*Urginea maritima*), and another stated that 'The poison used principally was Liquid Extract of Red Squill, and this poison has been found to be more efficient and satisfactory than any other previously used.'

Enormous numbers of rats are, of course killed every year in country districts as well as in the towns, but no estimate can be formed of the destruction accomplished in this way. We may, however, give one example quoted by Middleton (1937), that of the Whipsnade estate of the Zoological Society, where trapping and gassing for rats is carried on all the year round; here 3,228 brown rats were known to have been destroyed in 1935 and 3,005 in 1936.

THE STATUS OF THE BLACK RAT

I have discussed elsewhere (Matheson, 1939) the position of the black rat, *Rattus rattus*, in seaports in the British Isles, and have shown that while in some ports it appears to be decreasing (see also Table II, Bristol, in the present paper) in others it is maintaining its numbers and/or tending to extend its habitat from the immediate vicinity of the docks to the city proper. The latter statement is applicable to the city of Cardiff, and as the data for two more years have become available to confirm this since the publication of my previous paper on the subject, it seems worth while to give the following record of black rats (including all three subspecies, *R. r. rattus*, *R. r. frugivorus*, and *R. r. alexandrinus*) from the city submitted to me for identification, from 1928 to 1940 inclusive.

Year					No. of <i>Rattus rattus</i> identified from Cardiff City
1928	.	.	.	.	37
1929	.	.	.	.	38
1930	.	.	.	.	48
1931	.	.	.	.	157
1932	.	.	.	.	71
1933	.	.	.	.	201
1934	.	.	.	.	37 (five months only)
1935	.	.	.	.	86 (figures incomplete)
1936	.	.	.	.	121
1937	.	.	.	.	129
1938	.	.	.	.	274
1939	.	.	.	.	394
1940	.	.	.	.	570

In the city of London *Rattus rattus* is not only common, but is the commoner species at the present time, and the spread of this, a much more adept climber than the brown rat, is attributed by Hinton (1931) to, among other factors, the great increase in telephone cables and the adoption of various measures calculated to reduce the numbers of brown rats.

RELATIVE NUMBERS OF RATS AND MICE DESTROYED

Few data have been published regarding the relative

TABLE I

NUMBERS OF RATS AND MICE DESTROYED BY 'MEANS OTHER THAN POISON'¹ BY VARIOUS DEPARTMENTS OF MANCHESTER CORPORATION FROM 1921 TO 1939

Year	Number of Rats	Number of Mice	Total Rats and Mice	Mice as percentage of Total
1921	4,223	Not recorded		
1922	3,900	do.		
1923	2,556	478	3,034	15·8
1924	1,645	324	1,969	16·6
1925	1,400	1,912	3,312	57·7
1926	1,766	859	2,625	32·7
1927	2,279	625	2,904	21·5
1928	2,464	791	3,255	24·3
1929	2,188	283	2,471	11·5
1930	2,427	203	2,630	7·7
1931	4,530	193	4,723	4·1
1932	4,555	448	5,003	9·0
1933	5,912	305	6,217	4·9
1934	6,488	1,760	8,248	21·3
1935	4,392	1,191	5,583	21·3
1936	4,918	789	5,707	13·8
1937	4,346	538	4,884	11·0
1938	3,666	306	3,972	7·7
1939	2,209	631	2,840	22·2

numbers of different species of rodents destroyed in the same area in this country. One example is the work of Middleton (1937), who published a survey containing among other figures the numbers of rabbits and of brown rats killed at Whipsnade from 1931 to 1936. The Medical Officers of a few towns in England and Wales have published in their Annual Reports particulars of both rats and mice destroyed, and these Reports, supplemented by information kindly supplied by officials whose help is acknowledged at the end of this paper, have enabled me to prepare the accompanying tables.

It seems advisable, before discussing the relative numbers of rats and mice recorded in our tables, to define the zoological content of these terms. The 'rats' at Wolverhampton

¹ Dr. W. P. Cargill informs me that the heading 'Means other than Poison' is used to group the following measures of destruction employed: hunting (cats and dogs), trapping (nipper, cage traps, etc.), and ferreting.

(Table IV) can be taken as being entirely brown rats—the black rat being quite extinct in our inland towns; the rats recorded from Manchester (Table I) and from Bristol city (Table III) are also in the main brown rats, with probably

TABLE II
NUMBERS OF RATS AND MICE DESTROYED IN DOCKS, QUAYS, WHARVES,
AND WAREHOUSES AT BRISTOL FROM 1929 TO 1940

Year	Number of Black Rats	Number of Brown Rats	Number of Mice	Total Rats and Mice	Mice as percent- age of Total
1929	1,001	2,432	Not recorded		
1930	1,152	1,955	134	3,241	4·1
1931	1,522	1,448	149	3,119	4·8
1932	1,368	1,221	289	2,878	10·0
1933	1,099	900	356	2,355	15·1
1934	1,655	1,990	1,068	4,713	22·7
1935	849	2,451	850	4,150	20·5
1936	592	3,012	527	4,131	12·8
1937	592	3,347	390	4,329	9·0
1938	638	4,110	340	5,088	6·7
1939	723	5,169	575	6,467	8·9
1940	677	4,247	513	5,437	9·4

TABLE III
NUMBERS OF RATS AND MICE DESTROYED BY TRAPPING AND FUMIGATION
IN THE CITY OF BRISTOL FROM 1929 TO 1940

Year	Number of Rats	Number of Mice	Total Rats and Mice	Mice as percentage of Total
1929	1,859	Not recorded		
1930	2,547	do.		
1931	1,772	12	1,784	0·7
1932	2,231	40	2,271	1·8
1933	1,399	33	1,432	2·3
1934	1,187	32	1,219	2·6
1935	1,310	63	1,373	4·6
1936	1,429	58	1,487	3·9
1937	1,943	203	2,146	9·5
1938	1,424	Not recorded ¹	1,424	0·0
1939	1,043	20	1,063	1·9
1940	1,259	50	1,309	3·8

a small number of black; but at the docks at Bristol (Table II) black rats form a considerable proportion of the total.

¹ In the earlier years for which figures are available, at Bristol as well as at Manchester and Cardiff, it was usual to record only the number of rats and ignore the mice (see Tables I, II, and III), or else to record only the total for rats and mice together (Table V). With regard, however to 1938 above, it would appear from enquiries made about similar cases, that the practice of recording the mice being once begun, it was continued every year unless the number of mice was thought too small to be worth recording. It is probable, therefore, that the percentage of mice in 1938 did not drop to zero as indicated above, but simply to some very low level, which, of course, would not affect the general trend of the figures.

As regards the 'mice,' these taken in cities are almost invariably the house mouse, *Mus musculus*; occasionally a few long-tailed field mice, *Apodemus sylvaticus*, may be taken on allotments or elsewhere, but not enough to affect the figures in any appreciable degree.

The type of habitat afforded for rodents by any of our great cities is fairly uniform and may be called, in the ecological term, a biotope; in which the rats and mice form part of a biocoenosis, the members of which are in greater or less measure 'dependent upon each other, and are thus forced into a biological balance, which is self-regulating and fluctuates about a mean' (Hesse *et al.*, 1937).

The statistics from Manchester, Bristol, and Wolverhampton of rats and mice taken by means of poison baits,

TABLE IV

NUMBERS OF RATS AND MICE DESTROYED BY VARIOUS METHODS IN THE CITY OF WOLVERHAMPTON FROM 1937 TO 1939

Year	Destroyed by Rat Lime		Destroyed by Traps		Taken Alive ¹		Totals			Mice as percent- age of Total
	Rats	Mice	Rats	Mice	Rats	Mice	Rats	Mice	Rats and Mice	
1937	61	87	124	256	1,539	89	1,724	432	2,156	20.0
1938	84	106	156	424	1,644	97	1,884	627	2,511	25.0
1939	214	321	178	79	1,376	112	1,768	512	2,280	22.4
Totals	359	514	458	759	4,559	298	5,376	1,571	6,947	22.6

fumigation, trapping, rat line, ferreting, and other measures indicate that the number of mice destroyed very rarely exceeds 30 per cent. of the total, and is usually much less. At Manchester the mice exceeded this proportion in only two years out of the seventeen for which figures are available; the mice did not constitute 30 per cent. of the rodents in any one of the eleven years recorded for Bristol, nor in any one of the three years for Wolverhampton.

At Manchester the average percentage of mice calculated over the whole period is about 17 per cent.; for Bristol docks it is only 11 per cent., and for Bristol city lower still. As will be noted later, however, the figure for any particular year usually shows no tendency to approximate to any such average, the characteristic feature being periodic rises and falls.

How far these records of the relative numbers destroyed provide any indication of the actual relative frequency of rats and mice in nature is a question that must remain open

¹ Dr. R. H. H. Jolly informs me that the category 'Taken Alive,' includes (1) rodents caught in nets or destroyed by dogs subsequent to the use of ferrets in their runs; (2) those caught alive in the Brailsford trap; and (3) those destroyed by dogs.

until further data are available. Much, of course, depends on the method of destruction employed; thus it will be noticed in the Wolverhampton figures that although the mice formed only 23 per cent. of the total rodents destroyed by all methods, they constituted no less than 62 per cent. of those taken in traps and 59 per cent. of those caught on rat line. This, however, may be partly explained by the fact that, as Hovell (1924) puts it, 'Mice are much less suspicious than rats,' or in the words of the Ministry of Agriculture and Fisheries Advisory Leaflet (1939), 'Mice are more readily caught in traps . . . than are rats.'

PERIODIC FLUCTUATIONS IN THE NUMBERS OF MICE DESTROYED

In the words of Rall (1936), the potentially unlimited prolificacy 'of the rodents is checked by the resistance offered by their physicobiotic environment (death rate). The interaction of these two processes results in a yearly fluctuation in the number of individuals in the population of positively all species of rodents.' In this respect, he observes, the Muridæ, like the Leporidæ and the genus *Sciurus*, and unlike the Dipodidæ and others, 'have a very high variability.' Correlating the biological nature of the propagation of various rodents in Russia with the variability of their numbers, he gives a curve showing the proportion of pregnant females in the population of *Mus musculus wagneri* Eversmann throughout the year, and comments that 'the periods of maturing and the periods of pregnancy are quite short; therefore, the mice, despite the forces that make for their destruction, succeed in bringing forth several litters during the protracted generative period . . . In nature (under usual conditions), the number of litters probably is not more than four or five. The prompt and frequent participation of the young in breeding also contributes to the complexity of the generative processes, as a whole, of these rodents.'

He refers also to the well-known 'outbursts' of propagation among the Muridæ, 'which entail overwhelming calamity in the economic activities of men.' These long-term fluctuations, apart from those which may occur in a single year, in the numbers of *Mus musculus*, are suggested fairly clearly by our present data. It will be seen from our statistics that the fluctuations are much more marked in the mice than in the rats, and the phenomenon is perhaps best brought out by Figure 1, in which the mice destroyed at Bristol docks are expressed, not in terms of actual numbers, but as a percentage of the total rodents destroyed each year. It will be seen that the proportion of mice does not fluctuate irregularly or approximate to any average figure annually, but instead shows

over a period of years a steady rise to a peak, followed by a steady decrease and then another rise. In this particular case the percentage of mice rises without a break from 4.1 in 1930 up to 22.7 in 1934, then declines equally gradually to 6.7 in 1938 and begins to increase again in 1939 and 1940. Without

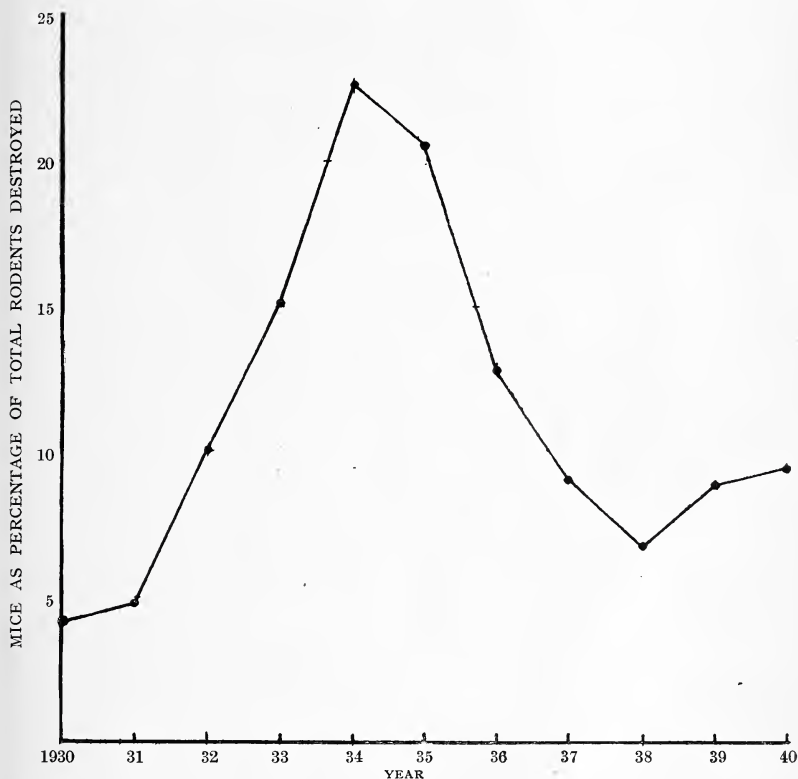


Fig. 1.

Mice destroyed at Bristol docks in each year from 1930 to 1940, expressed as a percentage of the total rodents known to have been destroyed. The suggestion of a periodic rise and fall in the proportion of mice is very marked.

applying any statistical formulæ for probabilities, it can fairly be assumed that a phenomenon so well marked cannot be a matter of chance in our data but must correspond to an actual fluctuation of the proportion of mice in the rodent population.

While the data for Bristol docks present a particularly symmetrical and striking illustration of this periodic rise and fall, there are clear indications of it also in the data for the cities of Manchester and Bristol. At Manchester the percentage of mice rose from 4.1 in 1931 to 21.3 in 1934-35,

decreased to 7·7 in 1938, and rose sharply in 1939. A similar phenomenon on a smaller scale is shown by the figures for Bristol city, though the period of increase in the mice continues here until 1937, to be followed by an abrupt drop, and the beginning of another increase in 1939 and 1940.

Rats are to a considerable extent competitors for the same kind of food and habitat as mice, and probably also have a more direct effect on the mouse population by devouring numbers of young mice; the rats are, in fact, to be numbered, in Rall's phrase, among 'the forces that make for their destruction,' and one might expect, therefore, that the peak years for mice would occur when the number of rats was unusually low. Thus the highest number of mice, both absolutely and relatively, at Manchester throughout the period (1912 mice, or 57/7 per cent. of the total, in 1925) was also the year when the number of rats, after a continuous decline for five years, reached its lowest level (1,400) for any of the nineteen years concerned.

Actually, however, the periodic rise in the proportion of mice seems to occur whether the number of rats is low or high; for at Manchester the year 1934, a peak year for mice, was also the year when the largest number of rats was taken (Figure 2). Similarly, at Bristol docks in 1934 and in the city of Bristol in 1937, there were peaks in the mouse population though the number of rats was also large.

It may be, therefore, that the mouse peak may reach a higher point than usual if the number of rats has declined to a particularly low level; but if our figures provide any indication, a peak will occur in any case. Conditions in our big towns are probably such as to provide adequate food and shelter for the established rat-mice biocoenosis, even when the larger species is numerous; though no doubt it is true that 'what the House Mouse population of the country can be at any given moment is limited by the size of the rat population among other things' (Barrett-Hamilton and Hinton, 1910-21).

Fluctuations such as we have discussed here have been studied in other species of rodents by various authors; for example, Middleton (1934) gives curves for the periodic rises and falls in the numbers of rabbits and hares in different parts of Great Britain. The period covered by our data for the mice, however, is not yet long enough to justify any suggestion whether the peak years tend to recur at equal intervals. A general adoption of the keeping of detailed records by public authorities might provide useful data on this question, which is of some economic, as well as purely scientific, significance.

Little can be said at present as to the causes of these numerical fluctuations. Prolificacy and death rate in *Mus musculus* are no doubt influenced at any particular time by

many factors—abundance of food, the prevalence or otherwise of epizootia, climatic and general biocoenotic conditions, etc. It may be mentioned that Wayson, as quoted by Findlay and Middleton (1934), reported on a great increase in house mice (and to a lesser extent in voles) in Kern County, California, in 1926-27; and stated that later both rodents were found

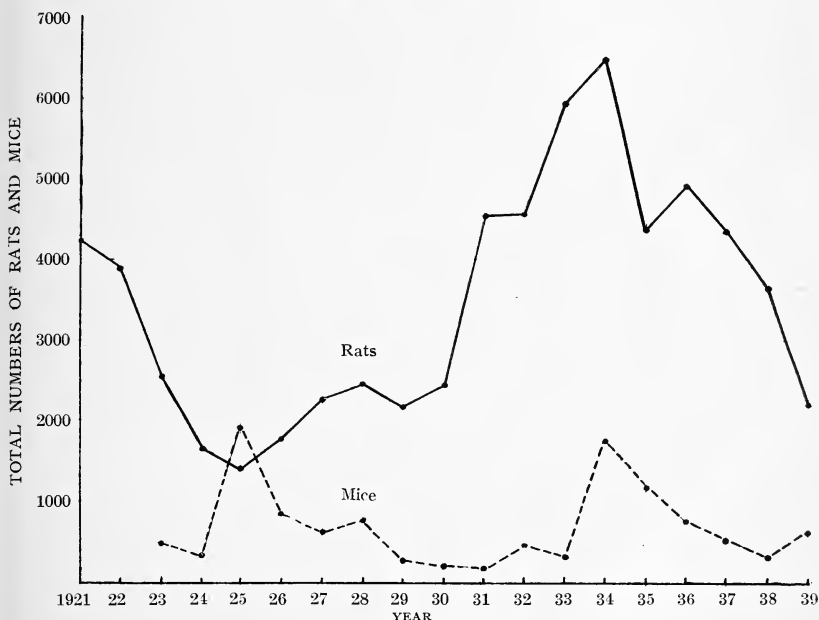


Fig. 2.

Total numbers of rats and mice destroyed by various departments of Manchester Corporation, from 1921 to 1939, by means of hunting (dogs and cats), trapping (with Nipper traps, cage-traps, etc.), and ferreting. The number of mice was highest in the year (1925) when the number of rats, after declining for five years, reached its lowest; but there is a second well-marked peak in the mouse population in 1934, the year when the number of rats was highest.

dying from a disease which was believed to be due to *Bacillus murisepticus*. No investigation has, however, so far as one can ascertain, been carried out on the fluctuations of *Mus musculus* in large cities.

As regards the season of the year when the results of the outbursts of propagation are most marked, the only information I have is contained in the data for Bristol docks, in which the numbers of rats and mice taken in each month of the year, as well as in each year, are recorded; to avoid overburdening this paper with numerical tables these figures have not been included—it will be sufficient to state that in 1934, the peak year when 1,068 mice were taken, more than half (actually

568) were taken in the four months July-October inclusive, with the maximum (191, or 37.4 per cent. of the total rodents for the month) in July. In other years the maximum proportion of mice taken (equivalent in most cases to the largest number taken) occurred at varying seasons; for examples, in January, 1935; March, 1933 and 1936; October, 1938; and December, 1939.

The suggestions put forward in this paper are to be regarded as purely tentative; but it is to be hoped that in the future more detailed data, covering a longer period of years, may make possible an accurate analysis of the position with regard to rats and mice in our great cities.

ACKNOWLEDGMENTS

My cordial thanks are due to the following: Dr. J. J. Greenwood Wilson, Medical Officer of Health for Cardiff, for putting at my disposal the numerous Annual Reports of Medical Officers extensively used in the preparation of this paper; also Dr. R. H. Parry, Medical Officer of Health for Bristol; Dr. R. H. H. Jolly, Medical Officer of Health for Wolverhampton; and Dr. W. P. Cargill, Assistant Medical Officer of Health for Manchester; for supplying a considerable amount of information not available in the Reports at my disposal.

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ORNITHOLOGICAL REPORT FOR NORTHUMBERLAND AND DURHAM FOR 1941

Compiled and much abridged from the records of the members of the Ornithological Section of the Natural History Society of Northumberland, Durham and Newcastle upon Tyne and others, by George W. Temperley.

(A Key to the initials appearing in these records will be found at the end of these notes. N.=Northumberland. D.=County Durham.)

The early months of 1941 were very wintry. A hard frost set in on January 17th, which continued with very little intermission until the end of February. On February 19th and 20th unusually heavy snowstorms swept the Northern Counties, and thick drifts of snow lay for many weeks in exposed places. This inclement spell of weather, following upon the severe winter of 1939-40, still further reduced the number of some species of resident birds. The scarcity of Song Thrushes and Wrens during the summer of 1941 was noted by many observers. The severe weather was followed by a long, dry period which lasted until nearly the end of May, providing very favourable conditions for breeding birds. During a fine autumn and a very mild December young birds were plentiful. Families of Long-tailed Tits were numerous, and other species of Tits showed a marked increase. Summer migrants did well on the whole; Redstarts and Pied Flycatchers being much more plentiful than in recent years, while Willow Warblers were particularly abundant. The large flocks of Starlings, which for many years have been a feature of the bird life of this area, were noticeably fewer.

CLASSIFIED NOTES

HOODED CROW.—As previous Reports have shown, Hooded Crows have for many years been very casual visitors to our counties and always in small numbers. The autumn of 1941, however, brought an unusual invasion. The earliest bird recorded was on October 12th, on the coast at Beadnell, N. (S. and J.A.). During November small flocks were reported from various parts of the area; but on December 1st a flock numbering from 150 to 200 birds was seen on the Stag Rocks near Bamburgh, N., and this flock remained at the same spot for some time (H.T. and J.A.). Two Hooded Crow and Carrion Crow hybrids were trapped at Craster, N., in the spring. One was chocolate-brown in plumage and the other showed very little grey on its body-plumage.

MAGPIE.—Steadily increasing in numbers. On December 21st, 28 birds were seen to fly to a roost in a fir plantation at Ravensworth in the Team Valley, D. (G.D.S.).

STARLING.—On February 20th a Starling was picked up dead in the grounds of the Newcastle Hospital for Infectious

Diseases bearing a ring marked 'Vogelwarte Rossitten Germania.'

HAWFINCH.—January 18th, one seen at Hexham, N. (B.M.O.). Now apparently resident in the neighbourhood of Newton Hall, Stocksfield, N., where a flock of about 12 was seen on December 25th (H.T.).

GOLDFINCH.—In November a few near Sunderland, D. (D.B.B.). On December 11th, two at Beadnell, N. (S. and J.A.).

SISKIN.—November 16th to 22nd, a flock of about 15 at Newton Hall, Stocksfield, N., feeding on the seeds of *Thuja* (H.T.). November 18th, one at Beadnell, N. (S. and J.A.). November 22nd, one at Stocksfield, N. on alder. (G.W.T.).

CROSSBILL.—On April 1st, a cock in full breeding plumage and with very advanced sexual organs was picked up dead on the outskirts of Dipton Wood, near Hexham, N., close to the spot where a pair attempted to breed in 1937. (See *The Vasculum*, Vol. XXIV, p. 56.)

CORN-BUNTING.—On November 24th, large numbers arrived at Beadnell, N.—'at one time about a dozen were seen together in the barbed wire entanglements,' but by the following day most of them had passed on. On November 27th numbers were seen arriving on a point near Seahouses, N. (S. and J.A.).

SNOW BUNTING.—On October 23rd, first arrivals seen at Beadnell, N.—a flock of from six to nine (S. and J.A.). On November 8th a flock of eight on stubbles at Craster, N. $\frac{3}{4}$ -mile from the sea (J.M.C.).

TREE SPARROW.—Several members report flocks in the late autumn and winter. On October 23rd and November 28th flocks were seen in Brandling Park, Newcastle (J.V.B.), and at the end of the year a flock of 30 was counted near Marsden, D. (S.E.C. and H.M.S.B.).

SHORE LARK.—On November 13th one was seen at Beadnell, N. (S. and J.A.).

YELLOW WAGTAIL.—On Migration—May 5th, one was seen on a potato field near Warkworth, N. (E.M.). May 9th, a flock of eight on newly ploughed land at Craster, N. (J.M.C.). A pair probably bred at Whittle Reservoirs, N.; they were first seen on May 25th and later observed carrying food. (H.T.).

PIED WAGTAIL.—Reported as scarce on Tyneside since the winter of 1939-40.

WHITE WAGTAIL.—June 2nd, one near Warkworth, N. (E.M.).

WILLOW TIT.—J. M. Craster writes from Craster, N.: 'When the light has been good enough to make sure, at least three in every four of the dark-headed Tits noted here during

1941 have been of this species.' All the birds examined in the Stocksfield, N., area during five years have been Marsh Tits (G.W.T.).

LONG-TAILED TIT.—Very plentiful indeed in the Tyne Valley. Many pairs bred successfully, and a large number of family flocks were seen during autumn and winter—'the largest number in my experience' (G.W.T.).

GREAT GREY SHRIKE.—On November 23rd a Shrike, believed to have been of this species, was seen to dash through a flock of small birds at Beadnell, N. (S. and J.A.).

WAXWING.—In November an 'invasion' of Waxwings occurred. In this area the first arrivals were reported on November 9th, on a patch of guelder-rose bushes (*Viburnum Opulus*) near Rowlands Gill, D., in the Derwent valley, their favourite haunt in previous years. When first seen this flock consisted of 13 birds, but by the end of December there were 41 (C.H.). On November 11th, a large flock established itself in Eldon Square in the centre of the city of Newcastle. This square is used as a car-park and is surrounded by a fringe of white beam trees (*Sorbus Aria*) which this year were very full of berries. The birds took little notice of pedestrian or wheeled traffic and were reported to roost on the roofs of the nearby houses. The flock reached a maximum of 44 birds and remained until the end of November, when the supply of berries was exhausted. During this time birds were seen in other parts of the city, probably portions of the same flock: thus, on November 15th, 30 birds were reported to be at Fenham Barracks, on the 24th, 10 were seen near Barras Bridge, and smaller numbers were reported from the city parks and gardens. It will be remembered that in the 1937 invasion flocks had visited the city, and in some cases the identical streets (G.W.T.). From other parts of the counties reports are few, probably through lack of observers; but on November 22nd a flock of 11 was seen at Ravensworth in the Team valley, D. (G.D.S.); on December 1st one was seen on Holy Island, N., by Richard Perry; on December 2nd one was seen near Chathill, N. (H.T.); and during the first week in December seven birds were seen near Hartlepool, D.; while at Middlesbrough, just outside our area, 20 were noted in a park feeding on white beam berries.

SPOTTED FLYCATCHER.—In a Stocksfield garden, N., a double brood was raised from the same nest. The cock was seen feeding the fledged young of the first brood while the hen was incubating the second clutch of eggs (T.E.H.). Very plentiful in Jesmond Dene, Newcastle, this year (D.B.B.).

SIBERIAN CHIFFCHAFF (*Phylloscopus c. tristis*). H. Tully writes: 'I saw a bird of this sub-species at Newton Hall, Stocksfield, N., on November 19th. It was almost entirely

brown on the upper parts and white beneath, with very dark legs. For further particulars see *British Birds*, Vol. XXXV, p. 180. The only previous record for Northumberland is one at Holy Island on November 12th, 1923.'

LESSER WHITETHROAT.—Four pairs were noted in the Prudhoe, Tyne Valley, area (W.E.). A cock sang during June-July in a Stocksfield garden, but no hen was seen nor nest discovered (G.W.T.). A pair was seen on July 19th at Longhurst, N. (W.A.W.). A cock was heard in a garden at Alnmouth, N. (A.M. and F.J.N.). A pair bred successfully in Upper Coquetdale, N. for the first time in the experience of the observer (T.W.).

COMMON REDSTART.—A nestling which was ringed at Newton Hall, Stocksfield, on June 27th, 1936, was caught at the same place four years later on May 23rd, 1940. An instance of how summer migrants return to the same area to breed in subsequent years (H.T.).

ROBIN.—On October 10th, after a strong S.E. gale, a flock of about 25 birds was seen at Beadnell, N. They were noticeably paler than local birds and were therefore probably of the continental race (S. and J.A.).

SWALLOW.—On November 9th a single bird was seen at Craster, N. (J.M.C.), and on the 15th and 23rd single birds were seen at Beadnell, N. (S. and J.A.). On August 17th a white Swallow was seen near Blanchland, N. (J.E.P.).

HOUSE MARTIN.—On November 30th a single bird was seen at Craster, N. (J.M.C.).

KINGFISHER.—Two hard winters have reduced the number on the Tyne and fewer bred about Prudhoe than usual (W.E.).

GREEN WOODPECKER.—This species is still further extending its range in Northumberland. Mr. D. H. Joicey reports that he saw one in a wood ten miles south of Berwick on March 25th (*British Birds*, Vol. XXXV, p. 59).

GREAT SPOTTED WOODPECKER.—A hen bird, ringed as an adult at Stocksfield, N., in March, 1933, returned annually to the same place to breed for eight years (T.E.H.). A Weardale gamekeeper reported that during the severe winter of 1940-41 he had picked up no less than three emaciated dead birds (J.G.).

LITTLE OWL.—Reports show that this species is holding its recently acquired status in Northumberland. A pair bred at New Haggerston, and birds were seen or shot at Seahouses, Craster and Bywell.

SHORT-EARED OWL.—Many were reported from the coast in October, November and December (S. and J.A.). On November 14th as many as five were seen together at Craster, N. (J.M.C.), and on November 1st two were seen near Lamesley in the Team Valley, D. (G.D.S.).

BARN OWL.—On January 28th, one near Bearl, Stocksfield (H.T.). On November 8th and 14th, one at Craster, N. (J.M.C.).

PEREGRINE FALCON.—Daily from October 16th to 23rd a hen was seen on the coast near Beadnell, N., pursuing waders (S. and J.A.). On December 8th a female was picked up dead on the south side of the Tweed below the Border Bridge at Berwick. It had been shot (R. H. Dodds).

HERON.—During the first week in November a Heron was shot on the Ellingham burn, half-mile S.W. of Lemmington, Alnwick, N., bearing a ring showing that it had been marked by the University of Oslo, Norway (F.E.L.). Until after the war it will be impossible to obtain data as to when and where it was ringed; but it is by no means the first Heron of Norwegian origin which has been found in this country. (See 'The Migratory Status of the Heron in Great Britain,' by N. F. Ticehurst in *British Birds*, Vol. XXXII, p. 243). A hitherto unrecorded heronry has been reported in a wood a few miles west of Harbottle, Upper Coquetdale, N. (T.W.). This wood was probably colonised after the destruction of the old Harbottle heronry following the last war.

WHOOPEE SWAN.—Regular observations on the loughs and reservoirs have been impossible this year, but the following brief notes show that in the winter of 1941-42 Swans were plentiful, though perhaps less numerous than in 1940-41 (see last 'Report'). December 21st, at Catcleugh, N., 20 (P.K. and G.W.T.). January 1st, 1942, at Hallington, N., 73 (H.T. and G.W.T.).

BEWICK'S SWAN.—At the end of December, five arrived at Catcleugh, N., and remained for some days (P.K.).

MUTE SWAN.—Apparently still increasing. During November and December a flock numbering up to 50 birds was on Gosforth Park Lake, N. (A.M.).

SHELDUCK.—On November 16th two were seen on flood waters near Lamesley in the Team Valley, D. (G.D.S.).

WIGEON.—Very plentiful off the coast in December. On the 2nd and 4th a vast flock, estimated to number some 2,500 birds, was seen off Bamburgh, N. (H.T. and J.A.). On December 20th, over a hundred on Gosforth Park Lake (A.M.). An irregular visitor to Newton Hall lake in small numbers, but this year the flock increased to 35 by the end of December (H.T.). None on Hallington or Colt Crag on December 21st, but about 120 on Hallington on January 1st, 1942 (G.W.T.).

POCHARD.—On June 24th five drakes at Newton Hall lake (H.T.).

SCAUP.—Inland, a female on Newton Hall lake on November 1st (H.T.).

LONG-TAILED DUCK.—First seen at Beadnell, N., on October 28th ; thereafter a few were seen almost daily until the end of the year (S. and J.A.).

[*Note*.—From October 19th to November 27th S. and J. Ash had under observation in Beadnell Bay from one to three 'diving duck' of unknown species. They were never seen at close quarters, but from their size, plumage and habits they were described as resembling immature Steller's Eiders. Unfortunately the birds were not reported in time for other ornithologists to see them with a view to confirming the visit of one of the rarest birds on the British list. There are only two records—one, a drake, at Caistor, Norfolk, on February 10th, 1830, and the other, a drake, off Filey Brig, Yorkshire, on August 15th, 1845. Immature birds are so inconspicuously coloured that they might possibly have been overlooked in the past.]

GOOSANDER.—On April 29th a Goosander's nest was found in Upper Coquetdale, N., about ten miles west of Rothbury. It was in a hollow tree at ground level about 20 yards from the river. Eleven eggs were laid, but most of them were taken and the bird deserted. The adult birds were still in the district at the end of June, and on October 7th nine birds in female or immature plumage were flushed from the river ; so it is possible than the hen laid again in the district and reared a brood (T.W.). Of recent years Goosanders have been observed to remain in our area well into the month of May, and breeding has been suspected, but this is the first recorded instance of a nest having been found south of the Border (G.W.T.).

SMEW.—From January 26th to February 2nd a pair in mature plumage remained on the River Aln at Alnwick, N. (J.E.R.). First seen on the coast on October 11th at Beadnell (S. and J.A.).

BLACK-TAILED GODWIT.—On October 15th four, and on November 11th, one at Beadnell, N. (S. and J.A.).

WHIMBREL.—April 21st, at Craster, N., a northward movement, July 25th, a southward movement (J.M.C.). Noted at Beadnell on October 1st, 7th, 15th and 16th (S. and J.A.).

WOODCOCK.—October 10th, first arrival on the coast noted at Beadnell. As late as December 25th they were still arriving, for three were seen to come in from the sea on that date (S. and J.A.).

GREEN SANDPIPER.—April 17th, one near Heddon-on-the-Wall, N. (A.M.) ; August 8th, one near Craster, N. (J.M.C.) ; November 17th, one near Warkworth, N. (E.M.).

GREENSHANK.—October 4th, two at Beadnell (S. and J.A.).

SANDWICH TERN.—A bird ringed as a nestling on the

Farne Islands, N., on June 24th, 1940, was recovered in Portugal on October 3rd, of the same year (T.E.H.).

BLACK-HEADED GULL.—Rev. Dr. J. E. Hull reports a hitherto unrecorded gullery at Holburn Moss near Belford, N. A few years ago the outflow of the moss was artificially dammed to form a sheet of water of considerable size encircling a flat island such as Black-headed Gulls like. It is now densely populated each season. Though no census of breeding birds has yet been taken here, two photographs, taken on July 2nd, 1941, of a portion of the island only, show more than 500 birds in the air or on the ground. J. M. Craster reports that when ploughing wheat stubbles at Craster, N., enormous quantities of Long-tailed Fieldmice were unearthed, and that 'Black-headed Gulls very gingerly captured a portion of them and swallowed them on the wing.'

GLAUCOUS GULL.—Seen in exceptional numbers on the Northumbrian coast at the end of 1941. R. Perry reports (*British Birds*, Vol. XXXV, p. 183) that on October 27th to 29th he saw a dozen, adult and immature birds, on Holy Island, and lesser numbers up to the middle of December. On November 2nd about a dozen were seen together at Beadnell, some in mature plumage, and thereafter one or more was seen almost daily throughout November and December (S. and J.A.). Hitherto mature birds have been very rarely observed on the coast.

GREAT SKUA.—October 4th, one seen at Beadnell (S. and J.A.).

LITTLE AUK.—The only one reported this winter was an oiled bird picked up dead at Beadnell on December 19th (S. and J. A.).

CORNCRAKE.—Reports were even fewer than for the last two years; but birds were heard calling at Haydon Bridge, N., near Langley, N. (W.C.), and near Wylam (W.A.W.). At Rowlands Gill, D., and Hamsterley Colliery, D. (C.H.). At Harperley, D., Witton-le-Wear, D., and near Bishop Auckland, D. (J.G.).

WATER-RAIL.—May 18th, two seen at Gosforth Park, N. (A.M. and F.J.N.). From December 20th to end of year, one at Newton Hall (H.T.).

Key to the initials occurring in the above Report : Sidney and John Ash, Mrs. J. V. Blackburn, Miss D. B. Blackburn, H. M. S. Blair, W. Carter, S. E. Cook, J. M. Craster, W. Eltringham, J. Greenwell, Mrs. T. E. Hodgkin, C. Hutchinson, P. Keeling, F. E. Lupton, A. MacRae, E. Miller, F. J. Nattrass, B. M. Oliver, J. E. Patterson, J. E. Ruxton, G. D. Sinclair, G. W. Temperley, H. Tully, T. Wallace and W. A. Wright.

INTERESTING DISCOVERY AT WHITBY

DURING the drive in connexion with the waste paper campaign, a parcel of complete copies of the late Martin Simpson's *Fossils of the Whitby District* was brought to light. Martin Simpson was the Curator of the Whitby Museum, and, like most curators, was a remarkable man. He wrote this book when he was 84 years of age. It is exceedingly scarce, as evidently only a few were sold before his death. It contains descriptions of 200 species of ammonites, and of about 200 other fossils. Simpson wrote many memoirs on the geology of the Whitby area, as well as on other subjects, details on which are enumerated in a memoir on Simpson and his Work written by Mr. Sheppard some years ago. The books recently found are shortly to be published by Messrs. A. Brown & Sons, of Hull, together with a lengthy Introduction by Mr. Sheppard.

JUST TOM SHEPPARD

The Museums Journal, the organ of the Museums Association, just issued, contains an editorial appreciation of the services of the Museums Director at Hull, who has just retired on age limit, and whose address now is 46 Anlaby Park Road, Hull. It states: 'Mr. Sheppard's influence in the museum world was not confined to Hull. He was President of the Museums Association in 1893, and has served on its Council on many occasions. In 1939 he was elected to Honorary Membership of the Association. He is a prolific writer, and was editor of *The Naturalist* for thirty years. In recognition of his scientific work he received the Honorary Degree of Master of Science from the University of Leeds in 1915. No mere official record depicts Tom Sheppard as he is known to all members of the Museums Association. He is a man of boundless energy and imagination, a man who has brought to light more finds than any other curator, a man who had made publicity an art—in short, just Tom Sheppard.'

THE RED-NECKED GREBE NEAR YORK

ON January 25th, the Ouse was rising rapidly and the water flowing on to Clifton Ings rapidly formed a lake with a maximum depth of about two feet. A solitary Grebe occupied this area of water and in outline, with a rapier beak and long neck resembled the Great Crested, though of rather smaller size. The coloration however was quite different with a well-defined white patch on each cheek, a dusky coloured upper neck and a dark tip to the beak. It dived at intervals but seemed to find movement in the shallow water difficult and soon reappeared; possibly the reason that it preferred the shallow and probably fishless flood water to the nearby river was that quantities of broken ice were being carried down by the latter. A reference to Witherby convinced the writer that this was an example of the Red-necked Grebe, as it

corresponds exactly, even to the two slight patches at the back of the head.—E. WILFRED TAYLOR.

The Cryptogamic Flora of Leicestershire and Rutland : Bryophytes, by F. A. Sowter, pp. 68 (Edgar Backus, Leicester, 5/-). This is a very full account of the liverworts, bog mosses (*Sphagna*) and true mosses that have been recorded in these two counties which are usually grouped together for recording purposes. There is an ample introduction and explanation of abbreviations which are mercifully few. For geographical and geological references the reader is referred to Horwood and Gainsborough's *Flora of Leicestershire and Rutland* (1933), upon which work the arrangement of records is here based. First records and references to herbarium specimens are given, a useful feature. The number of species on record (265 Mosses and 61 Hepatics) compares very favourably with counties further west and south where there is a richer phanerogamic flora. The loss of species by drainage and building is commented on but is not so grievous as elsewhere. Mr. Sowter and those he thanks for help have completed a valuable piece of work.

A Supplement to the Yorkshire Floras, by the late F. Arnold Lees. Edited by C. A. Cheetham, F.R.E.S., and W. A. Sledge, Ph.D., B.Sc., pp. 134. London: A. Brown & Sons, Ltd., 32 Brooke Street, E.C.1, and at Hull, 1941, 6/-. *The Flora of West Yorkshire* by the late Dr. F. Arnold Lees was published in 1888. It was an excellent and very comprehensive work, including not only the Flowering Plants and Vascular Cryptogams, but also the Bryophytes, Lichens and Fungi. After its publication Dr. Lees made notes of all new records, etc., which came to his notice with a view to their being published as a Supplement. He also included many records from the North and East Ridings which were additional to those given in J. G. Baker's and J. F. Robinson's *Floras* respectively. The manuscript, which thus comprised records from the whole of the county, was completed about thirty years ago, and ever since then Yorkshire field botanists and others have been longing to have the records made available for reference. The work was entitled *The Vegetation of Yorkshire and Supplement to the Floras of York*. Dr. Lees, however, had not confined his work to stating the new records, but had included a large amount of additional matter which might have been published separately. We read in the Foreword to the volume now under review that 'The accumulated facts of distribution were used to outline a new theory of change in the vegetation and flora, and a new classification was proposed in place of H. C. Watson's groups based on distribution and altitudinal range. His new grouping into Ancients, Moderns and Recents, was largely based on the data in Clement Reid's *Origin of the British Flora* (1899). Dr. Lees' views upon the origin and history of the constituents of the county flora, the reasons for assigning species to his new groups and the supposed cycles of "assurgence" or "declinence" of each species were discussed *extenso* in the body of the work which hence differed markedly in scope, as it also did in style, from any previous *Flora*. The Yorkshire Naturalists' Union, to which body the work was offered, did not feel prepared to sponsor its publication. Apart from the financial considerations involved in the printing of so bulky a work, it was felt that the conjectural matter was altogether disproportionate in extent to the facts it embodied. As insufficient support could be found elsewhere its publication was postponed and finally abandoned.' About five years ago the Yorkshire Naturalists' Union decided to proceed with the publication of the records, and Mr. C. A. Cheetham undertook the arduous work of extracting them from Dr. Lees' manuscript. The result appeared as supplementary parts in *The Naturalist* during 1937-40. Subsequently it was decided to publish the parts in book form, and the original title was, on account of its

misleading ecological connotation, changed to *A Supplement to the Yorkshire Floras*, which thus conveys more accurately the scope of the work. Dr. W. A. Sledge, who now acted as editor, has made many corrections and added a number of new records. He has also revised the nomenclature and rearranged the critical genera (e.g. *Rosa*, *Euphrasia*, *Potamogeton*, etc.). Mr. A. E. Bradley has helped with the Brambles, but only those of the West Riding are treated of; it is hoped to publish a revised account for the other Ridings at some future date. The result of all this work is highly satisfactory, and the hearty thanks of British botanists are due to the editors for presenting the facts in a handy form for reference. The book is nicely produced, the printing clear on good paper, and the cover is attractive. The aliens, casuals, and escapes are distinguished typographically from the natives and denizens, these being printed in Clarendon type. We have very little criticism to offer. The vice-county numbers are only inserted for the critical species, and it would have been helpful to those botanists who are not familiar with Yorkshire if the numbers had been given for all the natives and denizens. There are a few records omitted, but this is the case in almost any *Flora*. On p. 10, *Lepidium Smithii* is stated to occur on calcareous uplands. In our experience it is a calcifuge plant. We have noticed very few mistakes in spelling. 'Hepponstall' should read 'Heptonstall,' and 'Kirby Stephen' should be spelt 'Kirkby Stephen.' The book treats only of the Flowering Plants and Vascular Cryptogams. May we hope to have at some future date a supplement volume giving the new records for Bryophytes and Lichens?—A. W.

Geology of the Appleby District, by H. C. Versey, D.Sc., F.G.S. J. Whitehead, Appleby, 2/-. Geological guides to specialised localities in the North of England are lamentably few, and we are therefore particularly indebted to last year's Yorkshire Naturalists' Union President, Dr. H. C. Versey, F.G.S., of the University of Leeds, for preparing a new edition of the *Geology of the Appleby District*. Since the publication of the earlier edition nearly twenty years ago detailed geological investigations in the Vale of Eden, the Cross Fell Inlier, and the adjacent fells by Hollingworth, Hudson, Turner, Shotton, and the author had necessitated the revision and even complete alteration of many of the older ideas. In consequence of this the guide was entirely rewritten and it presents a valuable synthesis in which all recent work is co-ordinated. The remarkable diversity of scenery in the Appleby district finds its origin in the great variety of rocks exposed there and in the profound movements through which they have passed. Ranging from Ordovician to Triassic in age, with a veneer of Pleistocene boulder clay, the rocks show the varied conditions through which the area has passed throughout geological time. Shallow muddy seas with abundant marine life, volcanic episodes, the intrusion of igneous rocks, mountain-building movements, desert conditions, and finally glaciation, all left their stamp on the country side. These successive periods are chronologically described in the guide, together with the precise localities where each group of rocks outcrops, as well as their lithological character and faunal content. In this respect a particularly useful feature of the handbook is the appendix of twelve detailed itineraries, which include exposures of most of the important geological formations and which should be followed by anyone not familiar with the geology of the area. The guide is completed by five clearly-drawn maps and a bibliography for further reading. The guide will be in demand not only by geologists, whose attention is directed to some unsolved local problems, but also by naturalists with a smattering of geological knowledge. Written in a lucid style and free from unessential scientific terminology, the guide may be strongly recommended to all field workers in the Appleby district. May we hope that it will be followed by similar guides dealing with districts within the borders of the county.

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Edited by

H. PEARSALL, D.Sc., F.L.S., F.R.S., and W. R. GRIST, B.Sc.,
The University, Leeds.

with the assistance as referees in special departments of

J. M. Brown, B.Sc., F.R.E.S.

W. H. Burrell, F.L.S.

Chris A. Cheetham, F.R.E.S.

Ralph Chislett, F.R.P.S., M.B.O.U.

W. J. Fordham, M.R.C.S., L.R.C.P., D.P.H.

Mrs. A. Hazelwood.

Mrs. Elsie M. Morehouse.

Thos. Sheppard, M.Sc., A.L.S.

W. A. Sledge, Ph.D.

H. C. Versey, D.Sc., F.G.S.

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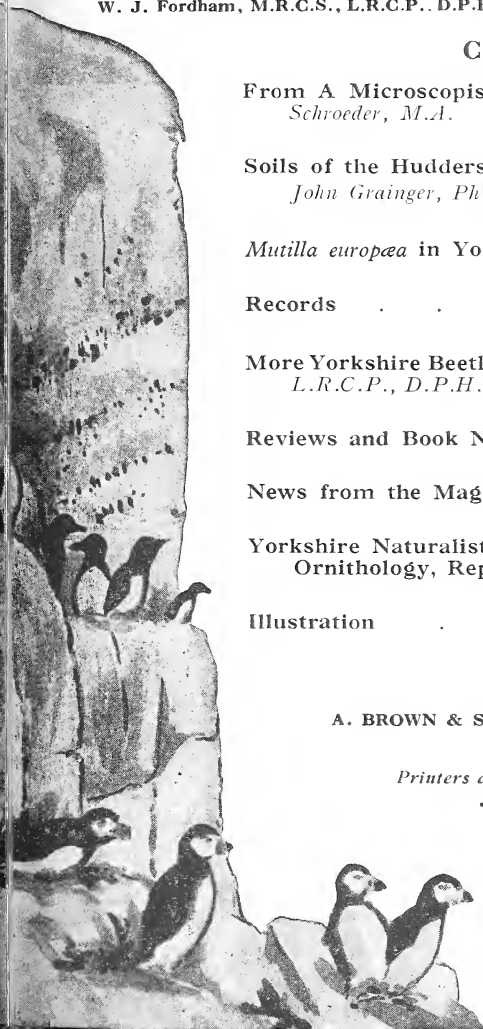
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RATIONING OF PAPER

Important Notice to All Readers.

Owing to the drastic order limiting the amount of paper used in the printing of journals, this number will be the last issued until July. It is probable that from this time on, *The Naturalist* will be published quarterly instead of monthly. Due notice of the completed arrangements will be sent to all subscribers.

Mr. H. E. FORREST'S ICE AGE THEORIES

ENCLOSED with this copy of *The Naturalist* is a reprint of Mr. H. E. Forrest's Presidential Address to the Caradoc and Severn Valley Field Club. The author invites geologists and other interested readers to send their comments to him. He would be prepared to attend a conference to discuss his theory if a sufficient number of people were prepared to meet him. His address is H. E. FORREST, Esq., F.L.S., Bayston Hill, Shrewsbury.

FROM A MICROSCOPIST'S NOTEBOOK

W. LAWRENCE SCHROEDER, M.A.

AMONG the best known of aquatic larvæ is that of the caddis fly, the variety of whose cases is a source of abiding interest. The angler has for its fat and luscious being a tender regard. Izaak Walton speaks of the 'cadis or case worms' as 'a choice bait for the chub or chavender, or indeed for any great fish.' His names for the larvæ are interesting—the piper, the cock-spur, the straw-worm, or ruff-coat, of which last he writes, her 'house or case is made of little pieces of bents, and rushes, and straws, and water-weeds, and I know not what, which are so knit together with condensed slime, that they stick about her husk or case, not unlike the bristles of a hedgehog.' Walton knows not how the 'cadis receives life, or what coloured fly it turns to; but doubtless they are the death of many trout.' Straightway follow directions for the preparation of that death—with which at the moment we are not greatly concerned—but we follow him as with a little stick in his hand he walks quietly by the brook that he may take the larvæ and 'consider the curiosity of their composure.'

From a pond in Elland Park Wood I collected on December a number of very young caddis-worms not many days old. Judging by the cases they were *Limnophilus flavicornis*. It was fascinating to watch the way in which they climbed up the smooth side of the jar in which they had been placed—a seemingly impossible task; there were about two dozen clinging to the side, probably helped by the sticky secretion from the jaws which is the binding element of the case. One of them was busy with a grain of sand—to fasten it to the case—when a small *Cypris* came near; at once the larva made a grab for the crustacean, but the reach fell short, and both sand and *Cypris* were lost.

On an early day in March, some years ago, I took from under the ice of a ditch-runnel at Leathley a naked caddis-worm. I put it in a jar with material from a Bramhope pond. Two days later it had completed a case made out of leaves in the jar and settled itself snugly among the vegetable debris, and on being deprived of its house it pluckily set to and made another.

Caddis-larvæ are more active at night or in late evening; in the early morning there is not much movement. Coming into the study late one evening—about eleven o'clock—I found the caddis most lively; in their scramble up the side of the jar, the third pair of legs did the holding on, while the other pairs were more actively engaged. On the particular jar side were microscopic algæ, which doubtless afforded sufficient foothold; one of the creatures kept its body at

right angles to the side of the jar ; its case was of plant material.

One of the caddis-worms, robbed of its case and with no fresh material at hand, made a case of soft decaying leaves, which one would have thought a hopeless undertaking. In a compassionate mood, I cut up some pieces of grass, and having gently urged the worm out of its slum tenement, I dropped it among the cut grass. For over an hour it nosed about among the grass, and then it began to build a new case. It seemed to spin stays upon the floor of the jar before it tackled its task. Six hours later one-third of the case was ready ; about five hours later—now eleven at night—two-thirds were finished ; and when I looked at the jar the following morning the whole case was completed ; but the work was not very close and not nearly as neat as that of the first case. I took the grass case away and put the larva among small flint and sand, but it seemed lost, apparently finding the stuff a tough proposition. It came to the top of the water, the dorsal half above the water level. It seemed to be losing interest in life. At mid-day I transferred it to the original Bramhope material ; straightway it began to eat, an activity neglected while it was busy with its varied housing problems, for evidently the instinct to build—for protection—is prime. By ten o'clock the following morning the caddis had made a new case, neat and compact.

Early one February I collected from a trough at Bardsey larvæ of the Micro-trichoptera family, Hydroptilidæ. I mounted one in glycerine. The pupa of one of the remaining larvæ emerged on May 29th. That also was mounted.

Larvæ have obligingly made cases out of material supplied : small pieces of match stick, bits of flint and sand, but I was never successful with beads—my larvæ were not so vain. Some larvæ just emerged from the egg made their first cases out of some filamentous algæ ; they looked entrancingly beautiful when examined under an inch objective and with dark ground illumination. A slightly older generation occupied themselves with *Vallisneria* leaf—a tougher job. Many of the creatures have pupated in my jars, closing the front and back entrances of their cases with the appropriate material, but I have been unlucky in the observation of the emergence of the imago. I have seen one fly emerge, but I was too late to note the complete process. With another individual I was more fortunate, but not entirely so. The pupa of the caddis came forth from its store case at noon one day in July. For a time it rested on the bottom of the tank with a spasmodic waving of its body, by which action the fly is freed from the interior of the pupal case. The pupa lay mostly on its back, but occasionally it jerked itself through the water before

renewing the up and down wavy motion. The antennæ cases were long, nearly the length of the entire body; there was a pair of long, thinly feathered swimming legs, and also a pair of front legs which seemed of little use in its pupal state save to take hold of surrounding material. There were two slight hooks at the end of the abdomen, and the wing cases were curiously marked. The movements from time to time ceased and the creature would fall to the bottom of the tank and lie, as if exhausted, for some time. On the following morning, sad to relate, I found the head apart from the body, and one of the swimming legs had gone. I suspected an assault by *Gammarus* during one of the pupa's quiescent periods. But, strangely enough, the body continued the undulatory motion for some hours, and I indulged hopes of some miraculous happening, but the hopes were disappointed.

At the moment I have a pupa in one of my jars and I am wondering whether my luck will be in—time will prove.

RECORDS

MUTILLA EUROPÆA IN NORTH RIDING

1. 30-8-'37.—Low Moor, above Robin Hood's Bay, 200 yds. west of Whitby-Scarborough road—*Mutilla europæa* (1) female, crawling over a patch of bare ground. Coll. W.R.F.

2. 7-6-'38—Eller Beck in Newton Dale, half-mile south of Goathland—*Mutilla europæa*, (1) female, under stone near stream.—Coll. J.H.F., WM. R. FLINT

BIRD NOTES FROM THE SCARBOROUGH DISTRICT

WAXWINGS.—In addition to the notes on these birds published in *The Naturalist* for February, the following may be added:—two at Goathland, November 11th, 1941, and a small flock at the same place on January 22nd and 23rd, 1942, reported by Captain Medlicott. A dead one picked up at Ebberston, and a party seen at Keld Head, Pickering, on January 1st, 1942, reported by Mr. R. M. Garnett. GLAUCOUS GULLS.—Numbers of these birds appear to have visited our coasts during the latter part of 1941, and many still remain. Scarborough has had its share of these beautiful visitors, the following having been seen at the Harbour by the writer: one in cream plumage, December 3rd, 1941; one adult, December 4th, 1941; one first year, December 29th, 1941; one adult, December 30th, 1941; four immature, February 9th, 1942; three immature, February 17th, 1942. During the severe weather of the latter part of January and early February many Scaup ducks found sanctuary in the shelter of

the Harbour. At low tide parties of Redshanks, Knots, Dunlin, and about a score of Purple Sandpipers ran over the mud, and a single large Plover, which the lack of field glasses rendered it impossible to say whether it was a Grey or a Golden Plover, was also present, its size strongly suggesting the former. On the beach many dead gulls were laid, victims of starvation. Other gulls and Jackdaws were tearing the corpses to pieces and eating the flesh. Owing to restrictions it was not possible to get on the beach and make a count, identify the species, or search for ringed birds.—W. J. CLARKE.

SOILS OF THE HUDDERSFIELD DISTRICT

(Continued from page 56)

THE CONSTITUENTS OF SOIL

The constituents of soil are :

1. Mineral particles of various sizes and different construction.
2. Organic matter from the decomposition of plants and animals.
3. Various chemical substances, some of which can be used as plant food.
4. Water with substances in solution, occupying part of the space between the mineral particles.
5. Air, which fills the spaces between the mineral particles not occupied by water.
6. Living organisms.

THE MINERAL PARTICLES can be graded into six sizes :

- | | | |
|----------------|-------|--------------------------------|
| A. Stones | . . . | Over 5 mm. |
| B. Gravel | . . . | Between 5 mm. and 2 mm. |
| C. Coarse Sand | . . . | Between 2 mm. and 0.2 mm. |
| D. Fine Sand. | . . . | Between 0.2 mm. and 0.04 mm. |
| E. Silt | . . . | Between 0.04 mm. and 0.002 mm. |
| F. Clay | . . . | Below 0.002 mm. |

Stones are of importance only when they are present in quantities great enough to obstruct the plough or spade. This sometimes happens on the shallow sandstone soils of the district. The unfortunate cultivator must then laboriously clear his soil of superfluous stone to a sufficient depth for the wielding of his spade or the driving of his plough. Gravel neither troubles nor assists the grower of crops when it occurs in soil. The other four sizes of particles are, however, of great importance to the farmer or gardener. They can be considered in two groups, for the coarse and fine sands are but large and small members of the same family, whilst silt and clay form another family. Chemical and physical differences separate the two groups. Sand particles are almost pure

silica, and are solid; silt and clay are complex aluminosilicates and are colloidal or jelly-like, with only a central core of solid material. Soils with a considerable amount of silt and clay are spoken of as heavy soils, and those in which sands predominate are light soils. These terms refer to the amount of energy required to work them. It is interesting that sand weighs more than an equal volume of clay (Table 1).

TABLE 1.—DENSITY OF SAND AND CLAY.

		Weight of 1 cubic centimetre of dry material	
		<i>grams</i>	
Washed river sand, Fenay Beck	1.	2.556	
	2.	2.577	
	3.	2.585	
	Average	2.572	
Glacial clay, Ravensknowle	1.	2.158	
	2.	2.152	
	3.	2.097	
	Average	2.135	

Table 2 shows the relative amounts of soil particles in the four finer grades for the main types of Huddersfield soils. A large number of estimations were carried out according to the 1927 International Scale, and the author acknowledges the valued assistance of Mr. James Walton, B.Sc., and Mr. George Sheard, B.Sc., with some of the determinations. All the analyses are not given, but the averages shown in Table 2 are in every way typical of each soil type.

TABLE 2.—AVERAGE MECHANICAL ANALYSES OF HUDDERSFIELD SOIL TYPES.

		Coarse Sand	Fine Sand	Silt	Clay
		%	%	%	%
1.	Millstone Grit sandstone	17	58	17	6
2.	Millstone Grit shale	9	37	28	25
3.	Coal Measures sandstone	11	55	28	6
4.	Coal Measures shale	5	32	33	35
5.	Glacial	5	24	36	35
6.	Alluvial	13	53	30	3

The sandstone soils of both Millstone Grits and Coal Measures are generally similar in composition, having considerably more of the large particles, coarse sand and fine sand, than of the finer silt and clay. They tend to produce a mat of turf if left as grassland, and are nearly always subject to summer drought, owing to their superlative drainage combined with the lack of water-holding power of the coarser particles. Coal Measures sandstones have usually more silt particles than Millstone Grit sandstones, a fact which renders them more retentive of water, and brings greater agricultural

possibilities. Indeed, the plateau from Farnley Tyas to Thurstonland (the Storths Hall area on Fig. 2) is a naturally fertile district.

Shale soils have a preponderance of the finer particles which is slightly greater in the Coal Measures than in the Millstone Grits. Their average analyses shown in Table 2 do not, however, indicate the profound difference in the natural supply of mineral nutrients which exists between these formations.

Glacial soils are the heaviest in the district, usually having 70 per cent. or more of the finer fractions. Alluvial soils have usually quite small amounts of clay. Fine sand appears to be the chief fraction, but there is a sufficiency of silt to make the soil retentive of water.

It should not be thought that heavy soils are better than light ground. The cultivator should recognize the particular qualities of each type, and adjust his work and cropping to the potentialities of his own plot.

DIFFERENCES BETWEEN LIGHT AND HEAVY SOIL.

	<i>Light Soils</i>	<i>Heavy Soils</i>
Maturity of crops .	Earlier.	Later.
Working of the ground	Can be worked almost any time.	Cannot be worked satisfactorily in wet weather; should be dug or ploughed in autumn.
Supply of plant food .	Usually lower than heavy soils, but usually respond quicker to manures.	Usually better supplied than light soils
Resistance to summer drought	Poor.	Good.

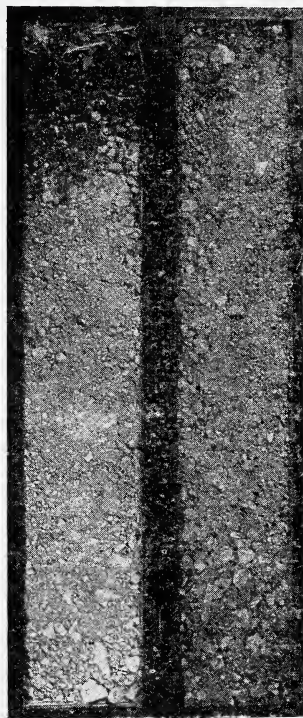
These indications should only be interpreted in a general way, for their effects are not always sharply marked. Some crops, *e.g.* carrots, grow better on sandy soil than on clay ground, whilst the marked preference of roses for clay soil is now almost proverbial.

ORGANIC MATTER.

Organic matter, the remains of earlier generations of plants and animals, makes the greatest contribution to soil fertility of any single factor. This is somewhat strange, for it is possible to grow plants very successfully in a solution entirely free from organic matter. Indeed, the new cult of hydroponics or water culture can make the non-organic desert bloom, and sometimes even bloom commercially. So long as the relatively cheap stores of fertility in soil are used for the growth of plants, however, the presence of organic matter will play a major part in the continuance of such fertility.

It is useful to distinguish between 'raw humus' where pieces of relatively undecayed organic matter occur free among the mineral particles, and 'humus' where the decay is well advanced and the organic matter is closely incorporated. When a soil containing raw humus is burned, there is a

Organic
matter
as a 'mat'
of turf.



Organic
matter
distributed
throughout.

A B

Figure 6

Vertical distribution of organic matter (shown dark in the photograph) on land which has never been ploughed (A) and on ground frequently cultivated (B) the samples are from Millstone Grit Sandstone soils at Dean Clough, Netherton, separated by only ten yards. Each sample is 1 foot deep.

diminution in volume, but no great shrinkage of volume occurs when soil with only humus is ignited.

TABLE 3.—HUMUS AND RAW HUMUS.

	<i>Original</i>		<i>After burning</i>	
	Dry Weight <i>grams</i>	Volume <i>c.c.</i>	Dry weight <i>grams</i>	Volume <i>c.c.</i>
Soil with raw humus, Meltham . . .	20	27	17.1	16
Soil with humus, Ravens- knowle Park . . .	20	26	15.9	25

ORGANIC MATTER AND WATER.

Organic matter affects the water-holding power of soils, and this action is conspicuous on sandy soils :

TABLE 4.—ORGANIC MATTER AND WATER CONTENT OF SANDY SOIL. DEAN CLOUGH, NETHERTON.

Depth.	1		2		3	
	Water	Organic matter	Water	Organic matter	Water	Organic matter
	%	%	%	%	%	%
Surface .	55	29	64	28	18	16
3 in. .	—	—	44	19	—	—
6 in. .	21	4	23	8	12	9
12 in. .	16	4	—	—	—	—
18 in. .	21	6	—	—	—	—
24 in. .	16	5	—	—	—	—

Percentages are calculated upon a basis of fresh weight.

The relative water-holding effect of organic matter is not so marked on clay soil :

TABLE 5.—ORGANIC MATTER AND WATER CONTENT OF CLAY SOIL. DEAN CLOUGH, NETHERTON.

	1		2	
	Water	Organic matter	Water	Organic matter
	%	%	%	%
Surface .	18	11	17	23
3 in. .	14	8	13	7
6 in. .	10	9	12	9

Percentages are calculated upon a basis of fresh weight.

Continuous pasturage and natural grassland allow the accumulation of organic matter as raw humus in the uppermost layers ; cultivation distributes it through a greater depth (Fig. 6).

Accumulation at the surface may be a bad thing on grassland, for the ' mat ' of organic matter thus created holds a large amount of water after rain and does not allow it to penetrate to the deeper layers, where it would be stored for the use of plants. The water held in the surface mat evaporates quickly, and the roots of plants do not grow into the lower layers as they would if more water were available there. There is also an effect upon the vegetation, for only those plants with somewhat aggressive rhizomes or root systems tend to survive, and these are not always agriculturally desirable.

The system of lea farming takes full advantage of this accumulation of organic matter. Short-term rotations of arable land are interspersed with periods of grassland husbandry, so that the stores of organic matter are used for the arable crops and then replenished by the grassland.

ORGANIC MATTER AND CROPPING.

The state of decomposition of organic matter is of importance in the successful growth of crops. Carrots, parsnips and the cabbage family do not take kindly to raw humus, and the Finger-and-Toe disease of the cabbage family is aggravated by organic matter. Potatoes are very tolerant of it, but even with this crop the disease Common Scab appears if the organic matter is in the form of raw humus, though not when it is decomposing.

ORGANIC MATTER AND THE PHYSICAL IMPROVEMENT OF SOIL.

Organic matter is of considerable importance in the improvement of soil texture, for it causes the fine particles of a heavy soil to form larger masses, which tend to behave like larger particles, and it also provides a colloidal or jelly-like coating for the finer particles of a sandy soil, making them more retentive of plant food and soil water. Organic matter thus lightens the labour of working heavy soils, and improves the cropping power of light land.

CHEMICAL DIFFERENCES OF SOIL TYPES.

A plant makes only a very small part of its solid substance from the constituents of the soil, but that small part is very necessary. It is usual to find that only three chemical constituents are likely to be deficient in soils, namely nitrogen, phosphorus and potassium. All soils contain some percentage of nitrogen, which is obtained from the organic matter, but soils vary in their power to break down the complex form in which the nitrogen exists in undecayed organic matter into the simpler forms, ammonia and nitrate, which can be used by the plant. There is also a variation in the extent to which nitrogen can be lost from the soil. Nitrogen can be lost in the gaseous form in all soils under special circumstances, e.g. water-logging. The nitrogen content of the soil must be regarded as a very changeable quantity, and no general indications short of chemical analyses can be given for estimating the amount at any one time. The cultivator must rely upon subjective indications such as the growth of his plants. Plants which are growing in soil deficient in nitrogen have poor growth of shoot and leaf, and the foliage may have a lighter green appearance than normal. Lack of sufficient phosphorus in the soil tends towards a poor root system, and insufficient potassium induces unequal ripening of fruit and lack of quality in storage organs such as potatoes. Huddersfield soils are almost all short of sufficient potash and phosphorus for the growth of maximum crops.

Nitrogen, potassium and phosphorus are added to the soil by any natural fertiliser like farmyard manure, poultry

manure or sewage manure, and in the form of artificial manures, most of which supply one fertilising element only :

Nitrogenous manures .	Sulphate of ammonia
	Nitrate of soda
	Nitro chalk
	Dried blood
	Shoddy
Phosphatic manures .	Superphosphate
	Basic slag
	Bone meal
	Mineral phosphate
Potash manures . . .	Sulphate of potash
	Chloride (or muriate) of potash
	Kainit
	Potash salts

Further particulars of these manures and their application can be obtained from the author's *Garden Science* (Univ. London Press, 2/6).

The availability of manures for plant growth is dependent upon the amounts of other substances in the soil, the presence or absence of calcium probably playing the biggest part in this respect. Magnesium and iron are also requisite for the growth of green plants. Calcium, magnesium, sodium, potassium and other elements are often spoken of as 'soil bases.'

Those elements which will dissolve in soil water are perhaps the most directly important, and a big difference can be observed between those dissolved out of the Coal Measures and those from the Millstone Grits. The calcium and magnesium compounds particularly make the water hard, and Figures 7 and 8 show the results of a survey of water hardness carried out by Mr. W. Chippendale in 1938. The hardness of the main stream in the Meltham valley on the Millstone Grits is 9°, whereas that of the main stream in the Fenay Valley is 16°. Here then is some evidence of the better supply of soil bases from the Coal Measures than from the Millstone Grits. It is interesting to note the large variations which occur in some of the smaller streams. Several of these in the head waters of the Meltham Valley have hardness above 10°, and one even has a hardness of 20°. These streams flow over pockets of thin bands of calcareous material which are known to occur at various places. They are usually beds containing numbers of fossils of marine molluscs, the calcareous shells of which supply calcium.

* One degree of hardness is the equivalent of 1 mgm. of calcium carbonate per litre of water.

MUTILLA EUROPÆA IN YORKSHIRE

T. STAINFORTH

IN reference to my note on this subject appearing in *The Naturalist* for December last, I am able through the kindness of correspondents to add to the records of *Mutilla* in Yorkshire. Mr. G. B. Walsh draws my attention to a record, on page 91 of *The Naturalist* for 1923, which I had overlooked, of a female captured by him 'on the slopes of a tumulus just north of the "Falcon Inn"' on September 9th, 1922. Mr. H. Britten also informs me *in litteris* that he has a note of a female *Mutilla europæa* captured near Glaisdale by T. Lofthouse, but with no record of the date, and that he himself captured two females in the Hole of Horcum on July 5th, 1937. These were found on the crest of the slope where the *Cornus suecica* thins out on the face towards Low Horcum Farm. Mr. Britten found out at first hand that the female *Mutilla* has stinging powers of no mean order. This I can confirm, for I have seen a specimen dropped with pained surprise on the part of the captor.

PURPLE EMPEROR BUTTERFLY

MR. J. P. UTLEY's reference to a Purple Emperor butterfly seen at Ewden Head on September 22nd, 1941, was both interesting and surprising. But for the most careful description any lepidopterist might have questioned his remarks. In happier times I devoted a considerable amount of time to studying and searching for this handsome insect, but I have never thought of it as a Yorkshire species nor heard of its previous occurrence in the county. The butterfly is a rarity even in its most favoured haunts in Southern England, and I never met with it north of Hunts. Its usual habitats are oak woods, where the males spend most of their time in the tree tops; occasionally they resort to stagnant water and decaying animal matter. The females, which lack the purple sheen on their broader wings, are more often seen near willow bushes. Neither sex visits flowers. Normally Purple Emperors are on the wing in July and are rarely seen after early August. The caterpillar feeds on willow leaves from late August until the end of September, when it retires into hibernation. All of this makes Mr. J. P. Utley's report of a butterfly on September 22nd an intriguing puzzle, but, of course, the unexpected sometimes happens in the butterfly world. It is possible that in such a late season as last summer the emergence of this particular insect was delayed considerably beyond the normal time. But this would not explain its occurrence at Ewden Head, and it will be interesting to hear further views on the matter.—GEORGE E. HYDE, F.R.E.S.

MORE YORKSHIRE BEETLES

W. J. FORDHAM, M.R.C.S., L.R.C.P., D.P.H.

SINCE compiling my list of Yorkshire Coleoptera in 1941 Mr. Barnes has sent me a further list of species. This contains four species new to the county, and these had better be put on record at once.

Stenus melanarius Steph. Between R. Derwent and R. Ouse. Barmby-on-the-Marsh (61), 3/8/41. A rare species found in marshy places and at grass roots. Widely distributed in Britain and recorded from Derbyshire, Lincolnshire, and Cumberland.

Saprinus virescens Pk. Several specimens beneath rotting leaves below Elvington (61), 21/8/41. A rare species found on watercress and umbelliferae preying on the larvæ of *Phaedon cochleariae*, which beetle it somewhat resembles. Taken in Lincolnshire and Nottinghamshire and as far north as Durham.

Ceuthorrhynchus angulosus Boh. Swept from thick vegetation in lane near Shirley Pool, Askern (63). Attacks leaves of its food plant, *Stachys sylvatica* and odd specimens found on *Mentha* spp. *Lycopus europæus* and *Gallopsia* spp. Occurs up to the south of Scotland and has been taken in the Manchester district.

♂. *nigrinus* Mm. Vegetation by river, Linton-on-Ouse (62), 11/7/41. A rare but widely distributed species taken in the north of Scotland. Its larvæ lives in the stem of *Fumaria officinalis*. It has been taken in Lancashire, Cumberland, and Northumberland.

Additional localities are:

Stenus ater Mn. Beneath stone by R. Wharfe, Tadcaster (64), 8/2/41. Knaresborough (64), 26/4/41.

S. nitens Steph. Boroughbridge by river (P64), 11/7/41.

Apion ononis Kirb. Swept from rank vegetation, Spa Ghyll Woods, Ripon (P64), 10/8/41.

Phytonomus pedestris Pk. Askham Bog (P64), 24/9/39.

REVIEWS AND BOOK NOTICES

Scientific Publications of the Freshwater Biological Association of the British Empire, Nos. 4 and 5. The value of the work done by this Association at Wray Castle, Windermere, can be seen in these small handbooks, all of which are available at the low price of 1s. 7d. They show how the distribution of small but important groups of animals is being studied in the Lake District, and they must be of great value to our members who study the ecology of the animals and plants of Yorkshire. Dr. T. T. Macan gives (No. 4) 'A Key to the British Water Bugs' (Hemiptera-Heteroptera) excluding Corixidae, which he dealt with in No. 1. His notes on the habitats as seen in the Lake District are useful to field workers. D. J. Scourfield, of Leytonstone, and Dr. J. P. Harding, in No. 5, give 'A Key to the British species of Cladocera (Water Fleas)'. Here again the distribution and ecology of the group in the Lake District show the amount of work that has been done. Water fleas have some economical value, one of the authors writing in 1898 (Scourfield) stated that methods of fish culture depend very largely upon a knowledge of the value of Entomostraca as food for fishes. The large *Daphnia magna* is sold as fish food for use in aquaria. An interesting fact given in the book states that Cladocera have been hatched from mud which has been dry for twenty years. In water-supply we are told their abundance is sometimes a great nuisance, but their abundance is due to the presence of their food supply in plenty, and this may be most

injurious if not dealt with in this way. Here is work for the student, and as the authors state more knowledge of their geographical distribution is needed.—C. A. C.

A Check-List of British Birds (Revised Edition), by **H. F. Witherby**, pp. 78 ; H. F. and G. Witherby, Ltd., 5/-. A new edition of Mr. Witherby's valuable Check-List was, of course, necessitated by the publication of the revised Handbook recently completed in five volumes. In the first list published in 1924, a total of 496 forms was given, these representing 418 species. In the new list there are 520 numbered birds, representing 424 species. Birds which breed in the British Isles, or have bred occasionally some time during the present century, total 219 ; there are 82 regular winter visitors and passage-migrants, 238 occasional and irregular visitors, and the extinct Great Auk. Of the breeders, 20 must be included among the two later categories. The Check-List is an indispensable item in the ornithologist's library. The nomenclature is right up-to-date, and the present status of species is given. The printing is on one side of the paper only, allowing for worker's notes.

The Birds of the Liverpool Area, by **Eric Hardy**, pp. 279 ; Buncle, Arbroath, 8/6 ; or from the author at 47 Woodsorrell Road, Liverpool 15. The area dealt with by Mr. Hardy comprises ' that part of West Lancashire and West Cheshire between the Ribble and Dee estuaries and inland to Wigan, Warrington and Chester, with the adjoining parts of North Wales to Llandudno.' Mr. Hardy has done a useful piece of work in bringing together such a host of valuable bird records of the Liverpool area. Such a compilation has been long overdue, as, in spite of Coward's *Fauna of Cheshire* (Witherby, 1910) and other earlier works, the actual area dealt with has been somewhat neglected. The book is inscribed as No. 1 of the Merseyside Naturalists' Association Handbooks. This Association was founded in 1938, quickly acquired a membership of nearly 200, and has soon shown signs of its energy and that of its secretary, in publishing the work under review, at a time when printing and associated difficulties are manifold. There are chapters on local bird haunts, local ornithological collections, local variations in bird laws, migration, a bird census, and at the end of the volume a bibliography. The entries under separate species often contain much detailed recording with dates and places. Mr. Hardy pleads for more and more field observation, and he will surely have the sympathy of all bird-men of to-day. It is possible from his remarks to infer that Mr. Hardy is willing to accept sight records a little too readily. It must be generally agreed that for quite a number of occasional visitors completely satisfactory identification requires more than the necessarily hurried field observations of a solitary enthusiast, however honest he may be.

NEWS FROM THE MAGAZINES

The *Entomologist* for January contains ' The Proportion of the Pale Form of the Female in *Colias croceus* Fourcroy,' by E. B. Ford ; ' *Plebejus argus* Linnæus race *masseyi* (Tutt) in North Lancashire and South Westmorland,' by A. E. Wright ; ' Notes on some gall causing Cecidomyidæ, II,' by M. Niblett ; ' Further Comment on the International Rules,' by C. J. Wainwright and numerous notes and observations.

The *Entomologist's Record* for February contains ' *Cirrhoedia xeram-pelina* Hb.,' by A. J. Wilkinson ; Collecting Notes ; ' Notes on variation from the Worthing Museum,' by Rev. G. Wheeler ; and Supplements, ' Records and Full Description of Varieties and Abbreviations,' and ' The British Noctuæ and their Varieties,' by H. J. Turner.

YORKSHIRE NATURALISTS' UNION: COMMITTEE FOR ORNITHOLOGY

REPORT FOR 1941

Chairman : R. M. Garnett.

Recorders :

W. J. Clarke, F.Z.S. (North Riding) ; C. W. Mason (East Riding) ;
E. W. Taylor (York District).

West Riding Recorder, and Hon. Secretary and Editor of Records :
Ralph Chislett, M.B.O.U. (42 Broom Crescent, Rotherham).

IN spite of war conditions, which have compelled abandonment of some fields of observation, the keenness of Yorkshire ornithologists has again enabled a fairly comprehensive report. Ornithology depends much upon continuity of observation. We add to and build upon the work of the past. Such events as the invasion of Waxwings of the autumn of 1941 need to be recorded, even in war-time, in the proper place and manner, to supply the data that will be needed in the future. Only accurate data can keep pace with change ; and amassed from year to year, can provide the material by which knowledge may be advanced.

'During the year,' writes our North Riding Recorder, 'observations have not been easy owing to the military restrictions on visiting the beaches, cliffs and moors. The moors too have frequently been swept by extensive fires which have destroyed much of the forms of life frequenting them. Woodlands have been denuded of their trees, causing the partial disappearance of the forest dwellers in some districts.'

Although sustained, the cold weather of January and February was less severe than that of those months in 1940 ; and was much less disastrous in its effect upon inland bird life. Comparable reports of the wastage of bird life along the coast are not available. The prevailing winds continued from the north and east for a longer period than I remember in South Yorkshire, and the spring was cold and late. The weather continued cold but fine until well into June.

The arrival of some of the migrants was delayed beyond the normal average dates. There were few reports of early Chiffchaffs, but Willow Warblers were normal ; and on April 25th, these two species were the only migrants that could be seen or heard at such a sheltered place as Roche Abbey, in the south of the county. Although reported on April 19th and 20th in several districts, the main bodies of Swallows did not reach their breeding-places until early May. Cuckoos were heard near Doncaster on April 20th, and in Wharfedale on April 22nd ; but there were no other reports of the species until May 1st. Swifts were only a day or two later than their normal average date.

The breeding season was successful for most species. The failure in parts of South Yorkshire of some owls to breed, noted by A. Whitaker, had no doubt a biological cause comparable with that which enables some owls to produce large families in seasons of plenty. Such larger birds as gulls, ducks and some others suffered heavily from human depredations.

Migration along the coast found few observers in 1941, but the main parties of birds came and passed as usual. Continuous observation was difficult for most of us, even in our own districts. But reservoirs and other waters have had attention, not without interesting results.

The Redmires Dams, near Sheffield, have been watched regularly by J. P. Utley ; and the tabular form of his report, as far as it applies to ducks and waders, is published not less for the information it supplies than for the example it sets. If such reports were accurately prepared for a number of waters spread over the county, our knowledge of the arrivals, movements and dispersals of the various ducks inland would

be much improved. The Redmires Dams are on the high, open ground, directly in line between the estuaries of the Humber and the Dee; a factor that may have bearing on the occasional occurrence of Scoters and other sea-ducks. At the several other reservoirs north-west of Sheffield, ducks were only seen occasionally; but there were always some birds at Redmires, usually and mainly on the middle dam of the three, and never on the lowest. The information derivable from such tabulations is additional to, not in place of, that given by detailed observation duly noted in our note-books, as the notes from Redmires testify.

Some of those who have usually supplied notes to our Recorders have been unable to do so this year, for reasons connected with the war. We miss Alfred Hazelwood and others who are often in our thoughts. In the "Classified Notes" that follow, the names of those who have supplied information this year are given after each first record; thereafter initials are used. The Halifax group (W. Greaves, V. S. Crapnell, G. R. Edwards, H. Foster and E. Watson) have as usual worked as a team and are again indicated collectively as 'H. Notes.'

The records of ringed birds that have been established are shown in a separate list. All other records have been brought together under one heading for each species, which will be advantageous for our own comparisons, and also to students in the wider ornithological field to whom our data is useful. Where desirable, the letters N.R., E.R., W.R. and Y.D. have been used to denote the Ridings concerned and the York District.

The nomenclature used, and the systematic order followed, are those of the 'Check-List of British Birds' prepared by Mr. H. F. Witherby from the new *Handbook of British Birds*, of which a copy appears at the end of Volume V of that latest and most complete of all works on British birds, and which will remain standard for a long time. The numbers that precede the names of species are those of the 'Check-List,' and are intended to simplify order and reference, and partially to serve the same purpose as the use of scientific names.

CLASSIFIED NOTES.

1. THE RAVEN.—See Records of Ringed Birds. The bird came from a nest situated in Yorkshire (A. D. Bateman, Hon. Sec., Sedbergh School Ornithological Society).

2. THE HOODED CROW.—More were seen in the winter of 1940-41 than for several years past, although only small parties were reported from the North Riding, seven near Scarborough Racecourse on February 24th, 1941, being the largest party (R. M. Garnett). Four were seen near Ayton on March 18th (T. N. Roberts), and four near Egton at Easter were the only ones seen for twelve months by A. S. Frank. Seventeen were counted in a field near Hunmanby (E.R.) on March 15th (T. Hyde-Parker). In late 1941 the species was far more numerous than in any recent winter about Thornton Dale (R.M.G.). Unusually large numbers came in from the sea about November 14th to the Whitby district (W. S. Medlicott). Several were seen near Little Weighton (E.R.) on December 3rd (Rev. D. Urquhart), two in the Museum Gardens, York, on November 5th (R. Wagstaffe), and one at Alne on November 15th (F. Jefferson). Odd birds have been noted in the West Riding this autumn at Swillington Ing on December 7th (A. G. Parsons), and at Bolton Percy—the first seen there by W. G. Bramley for several years.

4. THE ROOK.—On January 18th, Rooks were massed on the road at Bewick closer than I have ever seen them before (C. W. Mason); heavy snow fell on the 19th. Near York, large roosts are reported, 3000-10,000 strong in Common Wood, near Escrick (K. G. Payne) and similarly near Sproxtton (E. W. Taylor). And see Records of Ringed Birds.

DUCKS AND WADING BIRDS AT REDMIRE DAMS, Nr. SHEFFIELD, IN AUTUMN, 1941

Observed and compiled by J. P. UTLEY, B.Sc.

	SEPTEMBER.							OCTOBER.							NOVEMBER.							DECEMBER.															
	1	2	4	7	17	25	28	3	8	9	10	13	14	17	18	19	20	23	27	1	9	14	18	19	21	22	25	26	28	30	2	9	10	18	20	24	26	27
Mallard	4	9	12	6	8		3	20	20	12	14	28	58	28	6	21	16	14	6	6	30	8	34	34	28	30	42	38	4	24	40	40		42	6	38	36
Teal	4	6		2	4		12	8	12	12	10	14	20				12	3					8		4				4	4		4		4	4	4	4
Tufted Duck	18	16	14	22	2	15	1	24	6	15	16	15	26	8	11	10	14	8	2	6	6	9	12	10	8	12	2		5	6	6	4		2	2	2	4
Scaup	...	...				1														1																	
Velvet Scoter									9																												
Gadwall	...																																				
Garganey	...														1	1	1	1	1	1																	
Wigeon	...																			1																	
Common Scoter																																					
Goldeneye	...																						2	2													
Shelduck	...																																				
Common Pochard																																					
Shoveler	...																																				
Lapwing	...	100	80	120	400	100	60	40	100		50	40			2	100			1																		
Golden Plover	20	20					12				50	50	50	50	50																						
Common Snipe	6									1	8	6	6																								
Redshank	...	10																																			
Curlew	...	6																																			
Jack Snipe	...																																				

N.B.—The original table includes notes of the prevailing wind and weather, and of a few occurrences of species outside these two groups.

5. THE JACKDAW.—A bird in uniform French-grey plumage, but with the edges of the feathers tinged with deeper, brownish grey, was shot in Holderness. It was exhibited at the October meeting of the Y.N.U. Vertebrate Section by C. F. Procter.

7. THE MAGPIE.—As a result of the absence of gamekeepers this species, and the Jay, are reported to be increasing in many areas.

11. THE BRITISH JAY.—A party of 11 was seen at Ellerburn (N.R.) on February 2nd (R.M.G.).

14. THE STARLING.—A white Starling in Thornton Dale on June 20th, was reported by W. Ward (R.M.G.). And see Records of Ringed Birds.

18. THE HAWFINCH.—None was seen in 1941 near Egton Bridge where prior to the 1939-40 winter the species had been on the increase (A.S.F.). A pair were seen to be gathering nesting material in Thornton Dale on June 17th and 18th, 1941 (R.M.G.), and a pair were seen at Goathland (W.S.M.). In Thornton Hall garden a flock of about 20 fed upon yewberries during November to December; only the kernels were eaten. An injured bird near Levisham (December 13th) took haws, hips, holly, and sloes, but only ate the kernels. On one day it dealt with 609 haws, but sloes were its first choice. It was released on January 2nd, 1942 (R.M.G.). One bird was seen at Goathland on December 13th (W.S.M.). A Gilpin reports two birds seen near Leeds on April 27th and May 31st respectively. Bradford Naturalists Society report a bird seen at Hulton Wood, Skipton (W. J. Forrest). A pair were seen on Allerthorpe Common (E.R.) on June 15th (J. S. Ash).

20. THE BRITISH GOLDFINCH.—A pair nested near Sleights (W.S.M.). Many were seen around Scarborough throughout the year (W. J. Clarke). In Thornton Dale the species was unusually scarce, but wintering birds have been reported (R.M.G.). A steady increase in numbers of breeding birds is reported from Hull (G. H. Ainsworth), and from Sheffield (A. Whitaker). Four were feeding on thistles near Little Weighton (E.R.) on September 16th (Rev. D. U.).

21. THE SISKIN.—A flock of about 100 were in Castle Howard Park on December 7th, 1940 (R.M.G.). At Hackness (N.R.) there were three on March 24th, 1941 (T.N.R.). In the West Riding, at Hardcastle Craggs (H. Notes) at least ten fed on the same group of alders on which a party were noted from December 26th, 1936, to January 5th, 1937 (see *The Naturalist*, 1941, p. 28).

23. THE MEALY REDPOLL.—From November 7th a flock remained at Haxby, near York, for three weeks (F.J.).

25. THE LESSER REDPOLL.—Small flocks were seen between Escrick and Skipwith on July 3rd, and near Huby on December 25th (K.G.P.).

29. THE BRITISH TWITE.—Halifax observers report a party of 30 in Colden Valley on August 24th, and two on September 7th. Miss Tottie, of Grassington, reports about 40 feeding on her lawn on August 18th (C. W. G. Paulson). In view of the dates, these birds may have come from a Yorkshire breeding-place.

33. THE BRITISH BULLFINCH.—The species is reported as on the increase in several widely separated areas.

36. THE COMMON CROSSBILL.—Two reliable reports of the presence of this species reached R. M. Garnett during December, but he himself was not able to see them.

42. THE BRAMBLING.—E. W. Taylor described the behaviour of a party of 50 at Castle Howard on January 5th, 1941 (see *The Naturalist*, 1941, p. 62), and in early 1941 a specimen visited a Halifax garden bird-table. The latest record concerned a party on Haxby Moor, feeding, as often happens in early spring, on freshly ploughed land on April 12th (F.J.). In autumn the species was first recorded near Carnaby (E.R.) on a stack with goldfinches and chaffinches on October 1st (G.H.A.). Other autumnal records are of birds feeding on beeches near York on October 12th (J. A. Moffatt), of birds seen several times near Rowley

(E.R.) on and after October 29th (Rev. D.U.); of small parties in Wade Wood, near Halifax, on November 4th, and in the Hebden Valley on December 2nd; of 30 birds at Crimsworth on December 21st; and of one at Hardcastle Craggs on December 29th (H. Notes). In Duncombe Park, Helmsley, a party fed under beech trees on December 7th (E.W.T.), and in Thornton Dale, Mid-November and December 25th, 50-80 birds (R.M.G.).

43. **THE CORN BUNTING.**—Semi-colonial nesting has been noted in the Vale of Pickering. On August 9th six cocks were singing along a $2\frac{1}{2}$ -mile stretch, and hens were still being escorted over cornfields (R.M.G.). Although noted about York the species appears to be absent from the neighbourhood of the Howardian Hills (K.G.P. and E.W.T.). A nest in South Yorkshire on July 5th contained four pure white eggs (A.W.). Absence of comment presumes the species to have been normal in its well-known habitats in the East Riding; but in South Yorkshire nesting birds were less numerous than usual in several areas where they breed colonially—was this due to more intensive cultivation? (A.W. and R.C.).

44. **YELLOW BUNTING.**—After some years of scarcity near Scarborough considerable flocks were seen in the autumn (W.J.C.).

59. **SNOW BUNTING.**—About April 7th, 1941, a bird was seen on the cliffs at Skipsea (P. F. Holmes). On October 7th two were seen near Broomfleet (E.R.) where 'the reeds were literally thick with Reed-Buntings' (Rev. D.U.). Other autumnal records concern two seen at Goathland on October 20th (W.S.M.); a bird on Rosedale High Moor on November 2nd (K.G.P.); one near Rosedale Head on November 9th; one near Lockton on November 4th; and a small flock reported from near Levisham in mid-December (R.M.G.).

62. **THE TREE-SPARROW.**—A party of six were with some House-Sparrows in Thornton Dale on January 10th, 1941; but no breeding birds were seen in the neighbourhood in 1941 (R.M.G.). Two were noted near Filey on February 13th (T. H.-P.). On May 3rd birds were still in flock a mile or two away from the site of a breeding colony near Hatfield (R.C.). Fledged young were being fed near Keighley on June 25th (M. Longbottom). W. J. Forrest reports the species as extending in the Bradford area where formerly Gargrave provided the nearest breeding place. A number of nests found near Pocklington by J. S. Ash in May provide conclusive evidence that the species is not rare in that area; and around Rowley (also E.R.) the species is common and will build in nesting boxes (Rev. D.U.).

75. **THE TREE-PIBIT.**—First noted on April 20th, near Doncaster (G. E. Hyde), the next recorded date being at New Earswick (Y.D.) on April 25th (F.J.).

79. **THE WATER PIPIT.**—At least one of the birds reported at Keld Head, Pickering, on November 16th, 1940, remained until Mid-March, 1941. The species had arrived again at the same place by December 1st (R.M.G.).

88. **THE YELLOW WAGTAIL.**—At Swillington on April 27th there was a flock of 40-50 males (H. Notes). On April 22nd birds were already in the Austwick breeding area (C. A. Cheetham), having probably journeyed up the Lancashire rivers from the west. New Earswick (Y.D.) on April 30th (F.J.); and Bolton Abbey on May 4th (W.F.F.) are other early dates. A marked increase in the breeding stock in the East Riding was noted (G.H.A.), and the species bred plentifully near York (E.W.T.), as well as in other known haunts. Relative to three birds seen on May 3rd near Filey, T. Hyde-Parker remarked 'in twenty years I have never before seen more than an odd bird at one time.' A flock of about 20 were seen travelling westward from East Hull on September 7th (G.H.A.).

89. **THE GREY WAGTAIL.**—W. W. Nicholas reports the case of a bird that repeatedly attacked its own image reflected in the bright side of a

car radiator, an incident that has been reported before of wagtails. The species was noted in November and December along the River Foss above York (K.G.P.). One fed on the pond side in the garden of S. H. Smith on November 28th at Heworth, Near York.

90. THE PIED WAGTAIL.—A number fed on ploughed land at Heworth (Y.D.) on April 25th (S.H.S.).

91. THE WHITE WAGTAIL.—A pair on May 1st in a farmyard on the Derbyshire side of the county boundary, did not stay and were evidently migrating. They would probably need to cross Yorkshire (A.W.).

93. THE BRITISH TREE-CREEPER.—Of all the small birds that winter with us, this species appears to be least affected by severe weather, its numbers being not a whit reduced by two severe winters (A.S.F.). The York Report (E.W.T.) describes the species as unusually plentiful, particularly on park-lands.

96. THE BRITISH NUTHATCH.—During residence in Bradford up to early 1941, J. P. Utley noted the species in Calverley Woods. The species has increased and is now quite common in the wooded valleys of the Helmsley district (A. Gordon, per F. H. Edmondson), where several were seen on December 7th and 26th (E.W.T.). Two were seen in mid-April in the Goathland district, where a single bird was seen several times (W.S.M.).

98. THE BRITISH BLUE-TIT.—At Bolton Abbey a pair produced the first egg on May 22nd. On June 1st the clutch of 10 was complete, all 10 eggs hatched on June 13th, and all 10 were fledged on July 2nd (Rev. C. F. Tomlinson). Four nests have occurred in gas-lamp standards in Hull—a safe nesting-site there just now (G.H.A.).

107. THE BRITISH MARSH-TIT.—In Mulgrave Woods, near Sandsend (N.R.), on December 18th, 1941, there were unusually large numbers of Marsh-Tits, or possibly Willow-Tits (W.S.M.).

119. THE RED-BACKED SHRIKE.—G. H. Ainsworth describes the presence of a male near Hull on ten days during June (see *The Naturalist*, 1941, p. 271). The last definite record of a nest in the Sedbergh area was in 1934 near Hebblethwaite Hall, where eggshell fragments possibly of this species were picked up this year (A.D.B.).

120. THE WAXWING.—The immigration reported, affecting coastal counties from Inverness to Norfolk, included Yorkshire. A local immigration of considerable proportions occurred in the Scarborough district. Three were seen at the Racecourse on November 5th, and at Peasholm Glen on the 6th, where 24 were seen on November 8th. In Scarborough Cemetery there were 40 on November 18th. For a week in mid-November a flock varying between 40 and 100 visited some service trees near the Museum. On November 19th, 50 were seen at Spikers Hill near Ayton; and six were at Harley Street on November 27th. Single birds were noted at Ramsdale Valley, and by Scarborough Mere, in mid-November, where also parties of three and five were seen (W.J.C.). At Goathland on November 11th two were seen (W.S.M.); 20 were present in a park at Middlesbrough during the first week of December (G. W. Temperley in *British Birds*), and one at Filey in mid-November (T.H.-P). On November 12th two fed on viburnum berries in a garden at Malton, two more joined them in a few days, and three were still present on November 30th, a cat having accounted for one (M. L. Malone in *The Field*). A dead bird was brought to R. M. Garnett from Ebberston on January 2nd, 1942; and a party was reported from Keld Head, Pickering. In the West Riding, two Waxwings were seen on berried trees in a garden at Lightcliffe on November 4th and 5th (H. Notes), and during December (A. Haigh-Lumby).

123. PIED FLYCATCHER.—W. G. Bramley reports a male on May 1st near Bolton Percy (Y.D.) evidently on passage, and 'the only one I have seen in this locality.' At Bolton Abbey, Bradford Naturalists' Society reports only one seen this year. Three pairs nested in Forge

Valley, near Scarborough (W.J.C.). Two pairs reared young in Newton Dale, near Pickering, and a third male bird was seen (R.M.G.). Capt. Medlicott reports the species as almost entirely absent about Goathland, where two or three pairs usually nest. A bird was seen in a garden at Haxby (Y.D.) on August 8th (F.J.).

127. **THE BRITISH GOLDCREST.**—A pair nested at Egton Bridge (A.S.F.), and the species apparently holds its status in Thornton Dale district (R.M.G.). Numbers are still sub-normal in the York district (E.W.T.) and in South Yorkshire (A.W. and R.C.). Several pairs were noted about the conifers at Strines near Sheffield on May 4th; also noted in the same area on October 11th and November 23rd (J.P.U.). A bird was noted at Brandsby (Y.D.) on December 25th (K.G.P.); and G. H. Ainsworth noted birds in Boynton Woods (E.R.) on August 23rd.

129. **THE CHIFFCHAFF.**—The earliest record comes from Huby (Y.D.) on April 5th (F.J.). On October 4th a bird was heard singing in a Halifax street, in which district the species is a rare visitor (H. Notes).

132. **THE WILLOW-WARBLER.**—Although so many migrants were delayed in their arrival dates this year this species was about normal, being noted in South Yorkshire on April 14th (R.C.), near York on April 17th (F.J.) to April 22nd at Austwick (C.A.C.).

135. **THE WOOD-WARBLER** was not noted until early May; and the Blackcap and the Garden Warbler were no earlier.

145. **THE GRASSHOPPER-WARBLER.**—Singing birds were heard in the York district at Acomb Ponds on May 25th, and at Clifton Ings on July 14th (E.W.T.); at Skipworth on July 13th (K.G.P.); and S. H. Smith reports a pair at Stutton, Tadcaster, in June.

149. **THE REED WARBLER.**—The Scarborough Mere colony had at least five pairs (T.N.R.). In the Castle Howard district E. W. Taylor reports the species as 'decreasing, if not extinct.' At four breeding colonies in the East Riding numbers were normal (G.H.A.).

163. **THE WHITETHROAT.**—The earliest record was on April 29th at York (S.H.S.).

164. **THE LESSER WHITETHROAT** was not recorded until May 4th at Wigginton (Y.D.) (F.J.).

173. **THE FIELDFARE.**—The last record in the spring was at Bolton Abbey on May 4th, a party of 14 birds (W.F.F.). Strong flights were disturbed from thick thorns on the edge of the moors above Sheffield on October 9th (J.P.U.). Near Goathland the species was first seen on October 20th (W.S.M.). Near Thornton Dale the species was more numerous this autumn on the high ground where berries were far more abundant than in the dales. Flocks were passing south on October 31st (R.M.G.). A flock of 108 birds was counted at Crimsworth on October 26th and a flock of some 150 birds seen on December 21st (H. Notes).

174. **THE MISTLE-THRUSH.**—(See Records of Ringed Birds.) Much scarcer than before the last two winters, scarcely any breeding pairs about Goathland in 1941 (W.S.M.). Generally reduced in Yorkshire, but more breeding pairs in 1941 than in 1940 (R.C.).

175. **THE BRITISH SONG-THRUSH.**—C. H. Wells sends a note of a nest in his garden that was used twice. Four young were reared from the first laying, which began on March 28th. The second clutch was also four. In the Keighley district M. Longbottom reports the species as being still noticeably below usual numbers. In South Yorkshire singing birds in April were noticeably louder and nests more numerous than in 1940 (R.C.). And see Records of Ringed Birds.

178. **THE REDWING.**—Near Pocklington (E.R.) a Redwing flew to a tree and sang for several minutes on May 2nd (J. S. Ash). The record of a freshly-killed Redwing picked up on the roadside near Hunmanby (E.R.) on June 29th by T. Hyde-Parker was quite extraordinary (see *The Naturalist*, 1941, p. 174). An unusually early occurrence is dated August 27th, when a small party of 20, with a Wheatear in attendance

was seen south of Holmfirth (W.R.) by J. P. Utley, who was able to see the eyestripe and rufous flank-patch clearly through glasses. The species was very scarce about Thornton Dale in the autumn of 1941, in strong contrast to the numbers of the previous year. Several were seen near Goathland on October 24th (W.S.M.), and near York on October 26th (E.W.T.).

182. **THE RING-OUSEL.**—The species returned in larger numbers than usual to the hills about Bolton Abbey; about a dozen cocks sang in the Intake (Rev. C. F. T.). Much the earliest recorded date for the species was March 14th, near Ilkley (W.F.F.). At Whitsuntide, about Ingleton, a number of birds were seen and one nest; and another nest was found subsequently by Mrs. F. W. Bond.

184. **THE BLACKBIRD.**—W. Greaves records that a nest of 1940 was repaired and used again in 1941 for three successive broods. The cock was the same bird, and probably had the same mate in both seasons. Of the first clutch all four hatched, three out of four in the second, one out of five in the third. The first egg was laid on April 9th, the young bird produced by the third clutch left the nest on July 22nd. A pure white bird is reported from Saltaire Park; three years ago it was already almost white (Bradford Naturalists' Society, per W.J.F.). And see Records of Ringed Birds.

186. **THE WHEATEAR.**—The earliest records were at Colden Valley, near Halifax on March 16th (H. Notes), and at Buckhaw Brow on March 26th (C.A.C.). A migrating pair were at Swillington Ing on April 6th (A.G.P.), and a party, mostly females, near York on the same date (S.H.S.). There were numerous breeding pairs about Ingleton at Whitsuntide, and a nest with five eggs was seen (R.C.). W. S. Medlicott says 'now almost a rare bird in the Goathland district.' Several small parties were observed at Swillington between August 23rd and September 21st (A.G.P.). Birds were observed at Tilmire (Y.D.) on August 23rd (E.W.T.), and near York and Sheriff Hutton in September.

198. **THE BRITISH STONECHAT.**—A pair nested successfully at Egton (A.S.F.). None seen in 1941 in Thornton Dale (R.M.G.).

201. **THE REDSTART.**—From a nest with four eggs found near Doncaster on June 14th three young were reared; and the same nest contained a further two eggs on July 5th, which were also reared (G.E.H.). Although in the Whitby, Scarborough, York, and other areas numbers were above the average, the Rev. C. F. Tomlinson reports a decline in numbers around Bolton Abbey and for some years past. Old and young birds were feeding in the bushes along the stream at the head of Semerwater on September 11th and 12th (R.C.).

202. **THE BLACK REDSTART.**—A cock bird spent two days in the garden of Rowley Rectory on October 15th and 16th, 1940 (Rev. D. U.).

203. **THE NIGHTINGALE.**—The only report of this species is from near Doncaster, where a cock was heard on June 7th; and two further singers on June 9th, but no nest was found in spite of a close search (G.E.H.).

213. **THE WREN.**—I heard the bird singing in many places from which it was absent in 1940 (R.C.), but still below former numbers (A.W.). Reported to be recovering from its reduction in numbers also in Wharfedale (Rev. C. F. T.), and around Scarborough (W.J.C.), but still scarce in the Hull area of the East Riding (G.H.A.).

220. **THE SWALLOW.**—Reported from various places in South and West and East Yorkshire between April 12th at Saltaire, April 14th at Hatfield, and April 23rd at Bentham. G. H. Ainsworth notices many hundreds of swallows each year, resting in the rushes along the Seven Canal in the evenings of the first weeks of September.

222. **THE HOUSE-MARTIN.**—The earliest arrival dates reported were May 4th, near Doncaster (E. Lee), and May 5th in the Bradford area (W.J.F.). W. G. Bramley reports a curious case of the arrival in late

July of several pairs, some of which subsequently nested at Bolton Percy (Y.D.), where already there was one nesting pair. Although scarce in Scarborough, the species was numerous in the villages around, many sites previously abandoned being reoccupied in 1940, and again in 1941. Around Whitby the birds were fewer (W.S.M.). A bird of the year (brownish) was flying in Thornton Dale village on November 29th, 1941 (R.M.G.).

223. *THE SAND-MARTIN*.—First recorded on April 14th, when several were seen passing into South Yorkshire from the River Idle (R.C.). Reported from the Bradford area on April 20th (W.J.F.).

225. *THE SWIFT*.—The species arrived about its usual dates. May 1st, near Doncaster (E. L.), and May 3rd, near York (S.H.S.), were early dates. The local birds at Ben Rhydding and Bolton Abbey (Rev. C.F.T.) arrived on May 11th, although two birds had been seen at the former place on May 7th (the late H. B. Booth). In the Whitby area birds were fewer than usual, but generally birds were numerous. Three birds were still circling above an area of Sheffield on August 27th, and the species was last reported there on September 7th (J.P.U.).

227. *THE NIGHTJAR*.—Still decreasing around Whitby (W.S.M.), and in the Vale of York (E.W.T.). The species was not observed near Bolton Abbey, where only odd birds have occasionally been noted during the past 25 years (Rev. C.F.T.). In Houghton Woods (E.R.) I heard two in 1940 (Rev. D.U.).

234. *THE KINGFISHER*.—Reports indicate continued scarceness following the two severe winters. A. Whitaker reports from the Sheffield area that three known sites out of seven were occupied in 1941 against only one in 1940. Exactly over the nesting chamber of one a shaft had been driven down through 14 inches of hard ground, perhaps the work of a badger. The nest and eggs had been scooped out and mingled with the fish-bones and egg-shells were sufficient Kingfisher's feathers to make it probable an old bird had been killed. Along one stretch of the Wharfe the usual four pairs were reduced to one pair (A.G.P.). Several birds were reported from the York district, including Helmsley; but at Burton Constable (G.H.A.) and about Egton Bridge (A.S.F.) there were none this year. And see Records of Ringed Birds.

237. *THE BRITISH GREAT SPOTTED WOODPECKER*.—This species remains the most generally distributed woodpecker in the county; and in several areas has been a not infrequent visitor to 'bird-tables.'

238. *THE BRITISH LESSER SPOTTED WOODPECKER*.—A 'quite unmistakeable male' was seen at Hickleton, near Doncaster, on February 26th (Rev. F. W. Bond). The species is not often recorded in Yorkshire.

240. *THE CUCKOO*.—First heard near Doncaster on April 20th—a normal date (G.E.H.); and in Wharfedale on April 22nd (Rev. C.F.T.); and reported from various places on May 1st, 2nd and 3rd.

249. *THE LITTLE OWL*.—The species continues to be fairly numerous in South Yorkshire (R.C.), is reported as increasing in the Leeds area (A.G.P.), and in the East Riding (G.H.A.). In the York district a nest is recorded at Whenby on March 26th (S.H.S.); and a bird at Crockey Hill on November 9th (K.G.P.), and near Pocklington on May 20th (J.S.A.). To the north-east a bird is recorded at Lythe on November 15th, 1940 (W.S.M.). In the north-west, near Clapham, a bird was taken by a gamekeeper from a rabbit-hole, and was exhibited by C. A. Cheetham at the Vertebrate Section Meeting (Y.N.U.) on February 15th, 1941. The species now need cause no surprise if heard or seen anywhere in the county excepting on the high moors and hills.

250. *THE LONG-EARED OWL*.—The felling of fir-woods is causing scarcity in the Scarborough area (W.J.C.). Appears to have been slowly decreasing in South Yorkshire for seven or eight years past (A.W.).

251. *THE SHORT-EARED OWL*.—Two were on marshy ground near the Derwent in the Thornton Dale area on March 13th (R.M.G.). A

bird was seen on Allerthorpe Common on May 26th (J.S.A.). A pair were on Austwick Moss throughout the summer and were still there on October 16th (C.A.C.). A dead bird picked up on Addleborough on September 12th and brought to me had a broken wing, and appeared to be a bird of the year (R.C.); J. P. Utley has seen the species on the moors on that side of Wensleydale in the breeding season. There were three birds at Hatfield on November 29th (C.W.M.), and a single bird at Tilmire (Y.D.) on December 20th (E.W.T.).

253. THE BRITISH TAWNY OWL.—This bird is very plentiful in the York area, even within the city (S.H.S. and E.W.T.). On April 26th A. Gilpin climbed to a stick nest some 65 ft. above ground, and when halfway a Tawny Owl flew away. The nest contained an owl's egg and an egg thought to be a rook's, although the nest was solitary. A. Whitaker (South Yorkshire) writes: 'Probably bred in usual numbers but there appeared to be no attempt to breed by some pairs. A pair that have nested for four years in a box in my garden were frequently seen and heard but never laid. This applies to two other sites, one of which I have not known previously to fail to contain eggs or young during a long period of years.' There is no known evidence of failure to breed elsewhere.

254. THE WHITE-BREASTED BARN OWL.—Some pairs this year probably made no attempt to breed. Two sites always previously occupied held no signs of breeding. On two occasions, mid-July and mid-August, old birds were in one hole, and there was a large quantity of down on the bed of castings, and on the bark about the hole. The same remarks apply to the other site in an old pigeon-loft near Barnsley (A.W.). Birds are reported from the York district at Buttercrambe on April 20th (E.W.T.) and in April at Heworth (S.H.S.).

259. THE PEREGRINE FALCON.—Near Goathland a bird was seen on several days before and after November 6th (W.S.M.).

261. THE HOBBY.—Two flew over Goathland on August 2nd (W.S.M.).

263. THE KESTREL.—(See Records of Ringed Birds.)

268. THE ROUGH-LEGGED BUZZARD.—A Buzzard, 'almost certainly rough-legged,' in Mulgrave Woods on November 29th. A Rough-legged Buzzard at Arncliffe Wood, near Rounton, Northallerton on December 28th (W.S.M.).

269. THE COMMON BUZZARD.—The species appears to be spreading into the county from Westmorland. Jas. Batty reports birds in the Kingsdale Valley, near Ingleton, all through the winter of 1940-41, and under date 13/1/41 mentions having seen five in one day. On June 1st a Y.N.U. party watched a bird avoid the attacks of a Lesser Black-backed Gull, above Wherside.

271. THE MARSH HARRIER.—On November 26th, J. P. Utley was observing ducks on the surface of Redmires Dam, near Sheffield, through his telescope. Whilst watching the antics of some bathing Common Pochards, a clamour from some Mallard caused him to swing his glass over to them, they were all cruising out to the centre of the reservoir with heads erect and much quacking. A detailed examination of the shore revealed a bird of prey standing on a boulder. 'For ten long minutes I held it in the field of view, with its back towards me; then it leisurely flew to another boulder and again presented me with a view of its back. But I had seen a spread of ash-grey tail (without any white root) and an expanse of rounded wings of the same colour but with black flight feathers. The back was brown but the folded wings covered most of it. The head too was brown but much lighter. A second flight gave me a side view. The breast was buff smeared with brown, and under the chin was a lighter patch. The thighs were long and slightly reddish. A third flight took it over the dam. The wing beats were slow, and the wings angled high as the bird glided between beats.'

272. MONTAGU'S HARRIER.—A pair nested in 1941 and four young were hatched, and ringed when aged about three weeks, and were still in the nest a week later. It is believed they got away safely (R.C.). A male was seen in another area of the North Riding in April; and on May 4th a pair was seen, but whether they nested is uncertain, although a bird was observed on August 24th (A.S.F.). On May 24th a male was seen at Goathland (W.S.M.).

273. THE HEN HARRIER.—Several birds were seen in Cleveland in 1940-41 winter—a male near Egton on October 11th, 1940, and a male on Roxby Moor on October 31st, 1940 (W.S.M.); a bird in the Vale of Pickering on January 1st, 1941 (T.N.R.); a male near Lind Head, Harwood Dale, on March 28th, 1941 (E. A. Wallis). On December 5th, 1941, a male was seen near Thornton Dale (R.M.G.). W. Ward reports (per R.M.G.) that a female came down to his stuffed pigeon decoy on November 20th, and was obviously puzzled.

289. THE COMMON HERON.—At Lord's Wood, Gargrave, on April 20th, 1941, there were 19 nests in oaks and 2 in larches (W.F.F.). At Healaugh, 27 nests were in oak, 3 in spruce and one in larch; these included several small nests which would not have been thought to be occupied had not birds flown away from them. (E. W. Taylor, who went round with Mr. Beilby on May 22nd.) At Harewood, Mr. Wilson, the head keeper, informed the late H. B. Booth that there were only two nests, and that he thought the severe frosts of the past two winters had killed many birds. In Park House Ghyll, 12 old Herons were counted by the nearby farmer's wife. At Hubberholme there were seven nests at the top of Kirk Ghyll Wood where there were four in 1940. From Hornsea Mere there are no records this year. Concerning a Heron by a South Yorkshire reservoir, J. P. Utley noted that it walked up the bank from the water to excrete above high-water mark—an action he highly commends. The same bird also left the water to deal with an 8-in. trout. Two 5-in. fish which looked like roach, and numerous small fry, were swallowed without leaving the water. How long, asks J.P.U., do fish live in a bird's inside? This Heron was certainly not perturbed by any subsequent spasms made by those swallowed whole and alive.

300. THE WHOOPER SWAN.—A party of six were seen at Castle Howard on February 9th (E.W.T.) and on March 7th, and two adults on the Derwent on March 13th (R.M.G.). Two were seen on Withens Reservoir, Halifax, on October 28th, 1941 (H. Notes).

301. BEWICK'S SWAN.—In mid-November, 1941, 34 were seen by a local man on the flooded Derwent Marishes (Vale of Pickering). They were said to be very small for swans and were probably of this species. Of 22 swans seen by D. Green flying west over Eberston on November 15th, the species was uncertain (R.M.G.).

303 ETC. GREY GESE.—Gaggles were seen over York on March 10th and 23rd (S.H.S.). The note of a gaggle over Huddersfield on January 2nd, 1941, suggested the Pink-footed Goose (J. C. S. Ellis). Grey geese are reported from several places in the autumn. The first seen over Hull passed on September 5th (C. W. Mason), and on December 5th, at 4-30 p.m., about 100 passed over westward; two other gaggles, each of 50 birds, also passed over on the same day (G.H.A.). A large number of Pink-footed geese flew over Rowley (E.R.) on November 19th (Rev. D.U.). On November 29th six geese were seen at Hatfield (C.W.M.). Twenty flew north-west near Leeds at dusk on December 4th, and about 30 on December 5th (A.G.P.). Four swam on the far side of the Fairburn water on December 5th and flew before the telescope could be focussed (R.C.). There were two at Crimworth on December 21st (H. Notes), and a gaggle over Wheldrake (Y.D.) on December 28th (E.W.T.).

315. SHELD-DUCK.—Inland Records: On August 24th there were two immature birds at Swillington, and an adult pair on November

30th (A.G.P.). At Fly Flatts Reservoir there were three on September 2nd and one on September 18th—a bird remained for 24 days (H. Notes). At Redmires Dam near Sheffield a party of ten were present on November 21st and 22nd (J.P.U.).

317. MALLARD.—A wild duck nested in an old crow's nest about 30-35 ft. up, in Shire Oaks Wood, Healaugh (E.W.T.). Only one brood appeared at Swillington this year, most of the nests were robbed (A.G.P.), as also they appear to have been at Fairburn. But the species turned up in good numbers at its winter haunts. There were some hundreds at Fairburn on December 6th (R.C.). At Swillington numbers began to approach winter resident figures in mid-September, and in the last week in November there must have been 500 birds there (A.G.P.). J. P. Utley has kept a tabular record of all the birds present at Redmires Dam, near Sheffield, on 38 visits paid between September 1st and December 29th, 1941. There were only three days on which Mallard were not present. Fifty-eight on October 13th was the largest number counted on one day, this also being the date on which the largest numbers of Teal and Tufted Duck occurred. The average number of Mallard present on the 38 days was 20. Captain Utley's notes concerning habits are also interesting. After heavy rains had brought quantities of loose vegetable matter into the dam from the moors, a party spaced at intervals of some 2 yds. crossed and recrossed the water in line, picking particles from the surface. 'Treading' between one pair took place on November 25th, preceded and followed by the usual displays. 'On December 2nd I witnessed behaviour that was new to me. Forty Mallard were present, about half of each sex, and they were feeding near to shore. The day was bright and sunny. Suddenly half-a dozen made a short low flight, then closed their wings and came down in a glancing dive to be completely submerged for two or three yards. Soon all the party were taking part in this frolic, for such it appeared, and the fun lasted for 20 minutes. It seemed to be a game of 'who can stay under the longest.' Afterwards they drew near to shore, preened a little, and slept.' (J.P.U.). When gun-dogs, released from the cars of a sporting party, made straight for the water's edge, the Mallard on the far side rose and flew away; but the diving ducks which were much nearer took little notice of the dogs. Of the dogs from the local farm the Mallard took little notice.

318. THE GADWALL.—At Swillington Ing there were five females on August 16th (A.G.). At Redmires Dam, near Sheffield, on October 9th, a party of four fed near shore, aloof from the other species present (J.P.U.).

319. THE TEAL.—Usually present at Redmires Dam until mid-October in parties numbering up to 20 birds. Thereafter appearances were occasional and seldom exceeded four birds (J.P.U.). An average count of numbers present at Swillington during November approximated to 300 (A.G.P.). Several pairs nested (as normally) at Skipworth (E.W.T. and K.G.P.) and at other habitats, but a new drainage dyke in the Hatfield district reduced the species numerically in one breeding place (R.C.).

322. THE GARGANEY.—A drake remained on Redmires Dam from October 17th to November 1st—'I never saw it feed' (J.P.U.).

323. THE WIGEON.—During November the number present at Swillington averaged some 50 birds (A.G.P.). Only one bird was seen on Redmires Dam during the 38 days of observation, a drake on November 14th (J.P.U.). Reports of the species at Farnley Reservoir on October 4th, at Skipwith on November 23rd and December 27th, and on the Derwent on December 28th, when Skipwith Ponds were iced over, include no estimate of numbers (K.G.P.).

325. THE PINTAIL.—A pair was noted at Swillington on November 30th, and a drake on December 7th (A.G.P. and A.G.). The species is not reported from Skipwith, where it has nested occasionally.

326. **THE SHOVELER.**—Unusually, I did not see this duck in the breeding season at Fairburn this year (R.C.). No broods were hatched at Swillington (A.G.P.). On Redmires Dam there was a party of four on November 28th (J.P.U.). During November an average count of numbers present at Swillington approximated to 50 birds (A.G.P.).

328. **THE COMMON POCHARD.**—From February 9th and onwards 12-20 pairs frequented Castle Howard Lake (E.W.T.). At Fairburn drakes exceeded 30 in number on May 30th; a few ducks were also visible. On September 6th only 15-20 pochard were present (R.C.). At Swillington no broods hatched; but an average count during November approximated to 100 birds (A.G.P.). The species did not occur at Redmires until November 25th, whence a party of 11 remained until the 28th. From November 30th to December 24th there were always two birds; on December 2nd four were present (J.P.U.). At Pond Head (Y.D.) 25 drakes and 17 ducks were seen on December 25th (K.G.P.).

330. **THE TUFTED DUCK.**—A nest with chipping eggs was found on August 5th on some flooded ground in the south of the West Riding—an unusually late date (A.W.). At Fairburn, where the species is usually a feature, there were very few to be seen this year. There were six birds on Peasholme Lake, Scarborough, on March 30th (W.J.C.), three pairs at Castle Howard on February 9th, and six pairs at Skipwith on May 11th (E.W.T.). This duck is much more noticeable in the winter months on waters in South Yorkshire than 10-20 years ago. At Redmires Dam the species was generally present, numbers being greater during the period September 1st to October 15th; 26 was the largest number present at one time (J.P.U.). At Bretton Park, near Huddersfield, on November 25th this duck was much scarcer than in previous years, although the Mallard made a good show (J.C.S.E.). The species is reported from Farnley Reservoir on October 5th, and from Pond Head (Y.D.) on December 25th (K.G.P.), but no numbers are given.

331. **THE SCAUP-DUCK.**—There were two at Swillington on February 2nd (H. Notes), two on the Derwent near Thornton Dale on March 13th (R.M.G.), odd ducks at Redmires on September 29th and November 11th (J.P.U.); and on Withens Reservoir, Halifax, on December 13th (H. Notes).

332. **THE GOLDENEYE.**—A female occurred at Goathland on December 30th, 1940 (W.S.M.). At Swillington there were two ducks on October 26th and six on November 2nd (A.G.P.). At Redmires Dam two ducks were seen on November 18th, were still present on December 2nd, and had become three by December 9th, remaining so until December 20th. On December 26th there were two, one of which was winged and remained alone on the 29th (J.P.U.).

339. **THE COMMON SCOTER.**—One on White Holme Reservoir on September 20th, one on Fly Flatts Reservoir on September 10th (H. Notes). At Swillington an adult drake on August 6th, and a large party consisting of four adult drakes and one immature, and 52 females on November 30th (A.G.P.). On Redmires Dam, two on November 18th and 19th (J.P.U.).

340. **THE VELVET SCOTER.**—At Redmires Dam, on October 8th, nine ducks that appeared black were found by telescopic examination to have two white patches, a small one below and in front of the eye and a larger one below and behind the eye. They had also a white wing patch, and a slight knobble at the base of the upper mandible. All were exactly alike and they appeared to be immature males. They dived concertedly and on emerging would gather together before diving concertedly again. Dives lasted from 40 to 126 seconds. The keeper of the reservoir had had his attention drawn to them by the concerted diving (J.P.U.).

344. **THE SMEW.**—Two were seen at Swillington (male and female) on February 16th, 1941 (H. notes), and another female on December 7th, 1941 (A.G.).

342. THE GOOSANDER.—An adult male seen on the Derwent near Thornton Dale on February 9th (R.M.G.). A drake on Castle Howard Lake on December 7th (E.W.T.) and still there on December 14th (K.G.P.). There is no report from Eccup Reservoir.

346. THE CORMORANT.—Six birds were seen together at Burton Constable (E.R.). The species seems to be coming inland more frequently (G.H.A.).

349. THE GANNET.—A bird was picked up alive near Goathland on January 23rd, 1941 (W.S.M.). Nothing definite has been recorded about this species from Bampton, but birds are reported to have been there again.

368. THE FULMAR PETREL.—Two were seen flying inland near Thornton Dale, one flying south on April 23rd, wind fresh from the east, one flying east on May 27th after a night of fresh south-east wind (R.M.G.). Several were seen on various dates flying in and out of the top terraces of the Grand Hotel, Scarborough, and perching on them (W.J.C.). T. Hyde-Parker reports the species as fewer along the East Riding coast than a few years ago.

370. THE GREAT CRESTED GREBE.—With the inland lakes frozen, there were three on the Ouse (Y.D.) on February 4th (E.W.T.). A pair at Castle Howard had two young on June 25th. An odd unmated bird appeared most unwelcome to the pair, and after being repeatedly attacked it took wing followed by one of the pair and was chased round the lake for some minutes. Both re-alighted at opposite ends of the lake (E.W.T.) The species nested on Wentworth Dams and the other usual sheets of water in the Rotherham district, at Fairburn (but in smaller numbers than of recent years), at Coniston Cold, and Semerwater, where an odd bird remained with a well-grown young bird in September (R.C.). Three young, some four weeks old, were seen at Burton Constable (E.R.) on October 1st. Two old birds with four young were seen at Kelsey Hill on July 30th (G.H.A.), which is believed to be a new breeding place (C.F.P.). On May 18th, there was a pair of birds on Kilnwick Percy Lake (J.S.A.).

373. THE SLAVONIAN GREBE.—Two were seen at Swillington on September 21st (A.G. and A.G.P.).

375. THE LITTLE GREBE.—In January a bird was seen to bring up small fish through a hole in the ice (K.G.P.). As usual, the birds that visited the East Park Lake, Hull, in October, 1940, were noted again in March (G.H.A.). At Walkington (E.R.) a family of dabchicks seen on September 20th on the village pond were still there on October 8th, but disappeared shortly afterwards (Rev. D.U.). The species nested at the various customary places.

382. THE ROCK-DOVE.—There appears to have been a great increase in the birds at Buckton Cliffs (T. H.-P.). Is a possible reason to be found in birds that failed to return to homing lofts? Is there any pure Rock-Dove stock left in Yorkshire? (R.C.).

383. THE TURTLE DOVE.—One at Goathland on May 21st was 'the first I have known in the whole Whitby district since June 24th, 1924.' (W.S.M.). In usual numbers about Scarborough (W.J.C.). I saw several in Newton Dale and Thornton Dale on August 2nd. It is interesting that these birds so seldom cross the high moors at the heads of these dales, up which however the species penetrates farther than it does up the dales coming down to the western side of the Vale of York (R.C.).

386. THE BAR-TAILED GODWIT.—A bird stayed eight days from September 10th at Elland Sewage Works (H. Notes).

388. THE COMMON CURLEW.—Birds were noted at Strensall, Rufforth, Skipwith and Allerthorpe Common during May (S.H.S. and K.G.P.), and about Hatfield and Thorne Waste (R.C.). These are additional to the numerous high-lying breeding moors of the north and west and the

birds probably are remnants of a wider, lowland breeding stock of older times.

389. *THE WHIMBREL*.—At White Holme Reservoir, one on August 9th and 23rd and September 12th (H. Notes).

393. *THE WOODCOCK*.—A pair nested in Raincliffe Wood (N.R.) (E.A.W.). The bird was noted at Castle Howard on May 11th (E.W.T.). I saw and heard a Woodcock roding at Houghton Woods, near North Newbold on June 27th, 1940 (Rev. D.U.). At Goathland about November 14th, a few came in from the sea but only stayed a day or two (W.S.M.). At Farnedale on December 17th, nine were seen (C.W.M.). The species is more plentiful this winter near Hull than in 1940-41, where at one place the 1940-41 bag was only 10 against 43 in 1939/40 (G.H.A.).

398. *THE JACK SNIFE*.—Two birds frequented the stream at Pocklington for most of February and March, 1941 (J.S.A.). September 24th was the date of an early appearance at Pickering. The species was numerous at Keld Head in November, 10-12 being flushed (R.M.G.). Two seen by Redmires Dam on October 10th (J.P.U.).

402. *THE TURNSTONE*.—At White Holme Reservoir single birds on August 3rd and September 12th (H. Notes).

403. *THE KNOT*.—One at White Holme Reservoir on August 3rd, one at Green Withens Reservoir on August 16th, and at Gorple Reservoir on August 24th. One seen by flood water between Swillington and Fairburn on April 15th (H. Notes).

404. *THE SOUTHERN DUNLIN*.—A bird in short heather walked, then flew and trilled on high ground near Ingleton on June 1st (W. K. Mattinson). Three pairs nested on Ilkley Moor, at least one successfully (Bradford Naturalists' Report, per W.J.F.), where they were first seen on May 14th already well settled (W.F.F.). The following records may refer to this or to the Northern Dunlin. At Swillington on May 18th a party of 21 (A.G.P.). Birds were seen fairly often there in the late summer and early autumn, the largest party being 40 on July 27th (A.G.). On November 4th there were about a dozen on High Moor, Fryup, Danby (W.S.M.).

406. *THE CURLEW-SANDPIPER*.—At Swillington Ing, a single bird on June 1st, 1941 (A.G.P.).

417. *THE RUFF*.—At Fly Flatts Reservoir, one on September 8th and 10th; two on September 14th (male and female), and both still there on September 28th. At Elland Sewage Works one on September 12th. At Swillington one on July 13th (H. Notes); also an adult in autumn plumage on August 10th and 17th; and on September 14th two birds that still showed evidence of breeding plumage (A.G. and A.G.P.).

421. *THE COMMON SANDPIPER*.—Arrived on the Wharfe on April 16th (H.B.B.). Several pairs were nesting in 1941 round flat flooded areas (due to colliery subsidence) in the Dearne Valley, a type of habitat not typical of the species (A.W.). A late date for the species was October 12th at Swillington (A.G.) and September 28th at Fly Flatts Reservoir (H. Notes). Four on the Humber bank at North Ferriby on September 10th were evidently on their migration route (Rev. D.U.).

423. *THE WOOD-SANDPIPER*.—A bird of this species was observed at Swillington both on the ground and in flight on September 28th by A. Gilpin and A. G. Parsons.

424. *THE GREEN SANDPIPER*.—Two on August 23rd and one on August 24th and 27th at White Holme Reservoir. One on March 6th, three on August 19th, two on August 21st, and one on August 23rd at Elland Sewage Works. One on August 27th and on September 2nd at High Royd Sewage Works (H. Notes). One on August 24th and 31st at Swillington (A.G.). One on August 24th near Egton (A.S.F.). One at Keld Head, Pickering, on October 14th, and on November 3rd and 4th (R.M.G.). One on the Rye near Helmsley on September 30th

(E.W.T.). Two birds seen by the stream at Pocklington on July 16th may possibly have been of this species, although they appeared slightly larger and not quite so dark above. 'Their note was more like Green Sandpiper's than that of any other wader I have heard' (J. S. Ash).

432. THE GREENSHANK.—A bird was feeding along the margin of the River Ouse near Bishopthorpe on October 9th (J.G.). A bird was seen at Flixton Carr on May 1st, and again on May 3rd (T.N.R.). At White Holme, and Fly Flatts Reservoirs odd birds were seen on various dates in August and September, including four on August 23rd, three on August 28th and September 16th, and five on September 6th. Green-shanks were also seen in the same months at Blackstone Edge Reservoir, and Elland Sewage Works, and Cold Edge Dam (H. Notes). At Swillington were seen one on August 23rd and 24th, two on September 7th and 14th, four on August 31st and September 21st, and five on September 28th (A.G. and A.G.P.).

435. THE RINGED PLOVER.—At the Halifax district reservoirs and sewage works a few birds were generally present in August and September, the largest number seen together being eight on August 17th. At Swillington small parties were seen in September on the 14th and the 18th (A.G. and A.G.P.). The species nested as usual between Kilnsea and Spurn (C.F.P.).

440 AND 441. THE GOLDEN PLOVER.—The margins of Redmires Dams were frequented by parties numbering up to 20 from September 1st to 7th, and up to 50 from October 3rd to 19th, after which no more were seen until November 25th. From the latter date small flocks were generally present until December 20th. During the first period many young birds were included; the flocks of late November and December consisted of adults (J.P.U.). A large flock of about 500 birds was disturbed from a field at Pool-in-Wharfedale on September 27th. The field is especially attractive to plovers in both spring and autumn (A.G.P.). A large flock was seen near Hull during the first week in September (G.H.A.). Flocks were seen at Hatfield on August 21st, September 8th and October 15th (C.W.M.). Small flocks were seen near Helmsley on December 5th and 26th (E.W.T.) and at New Earswick (Y.D.) on September 2nd (F.J.).

449. THE LAPWING.—Flocks have been numerous and sometimes very large in the West Riding during the autumn, and the species seemed to pack early. At Hatfield flocks were seen on June 26th and July 24th and various later dates (C.W.M.). Three large flocks occurred near Hull in the last week of August. By Redmires Dams, on the high ground west of Sheffield, J. P. Utley noted in September that birds gathered to the number of some 400 were mostly birds of the year, and probably local; and by early October almost all had passed on. In mid-October further arrivals were also probably British bred. Lapwings were then absent until mid-December, when small flocks again appeared perhaps from abroad. A case of partial albinism in a Lapwing was noted at Gouthwaite Reservoir on July 27th by W. F. Fearnley (see *The Naturalist*, 1941, p. 275). Counts of Lapwings in the Esk (Cleveland) Valley over the years 1931-1941 were carried out by M. U. Lord and J. Lord (see *The Naturalist*, 1941, p. 286-7). See 'Records of Ringed Birds' where two Lapwings ringed in north-west Yorkshire are recorded as recovered in Ireland and Lancashire, both in January, 1941. There have been a considerable number of recoveries of Lapwing ringed in the north-west; and more than half of them were recovered in England on dates in autumn and winter as late (or later) as the recoveries in Ireland, France, and the Iberian Peninsula. Little ringing has been done in Cleveland, or in the Wolds, or Holderness areas; or it might be interesting to trace possible divergence in route or destination of birds from those areas, as compared with those of Lapwings from the north-west.

452. THE BRITISH OYSTERCATCHER.—A nest with three eggs was

found near Gargrave on May 13th (A. Thompson). Another pair were present and a second nest was found by R. B. Sturdy, who subsequently saw two young but did not see them on a further visit. The pair of birds by the Austwick Beck returned again (C.A.C.). An Oystercatcher was seen at White Holme Reservoir on August 23rd (H. notes).

469. **THE COMMON TERN.**—Single birds (Common or Arctic) were seen over Fly Flatts Reservoir on September 8th; and over Blackstone Edge Reservoir on August 30th and September 20th (H. Notes). An immature bird was seen at Swillington on September 21st (A.G. and A.G.P.).

471. **THE LITTLE TERN.**—Numbers of breeding birds near Kilnsea have been as usual. The colony on Spurn Point has moved back to sites formerly occupied along the isthmus (C.F.P.).

478. **THE BLACK-HEADED GULL.**—Birds arrived at their breeding stations as usual, but it is probable that not many young were reared, owing to the removal of eggs for human food. 'During the early spring frosts I had thousands of gulls, chiefly blackheads, behind the plough' (W. G. Bramley). A party of between 300 and 400 examined at Teesmouth in August was entirely composed of adults, 'the inference being that all their eggs had been collected for food' (A.S.F.). The same thing was noticeable at Scarborough (W.J.C.).

481. **THE COMMON GULL.**—A small flock at Crambe (Y.D.) on February 23rd (E.W.T.). Flocked with black-heads on Knavesmire (Y.D.) from August 17th onwards (E.W.T.). Seen with black-heads at Heworth and Heslington (Y.D.) in January (S.H.S.). The species was in evidence below my Rotherham garden throughout the cold period from January 19th, 1941 (R.C.). Is now a regular visitor to the Bolton Percy area following the plough with the black-heads (W.G.B.). In August and September there are several records of small parties of from two to six birds on the Halifax and Sheffield groups of reservoirs; thereafter I have no records until December. Why is this species developing an inland quest? Herring Gulls, and even Greater Black-backed Gulls, are showing more tendency to come inland. War conditions have coincided with exceptionally severe winters. Have the vast quantities of oil loosed into the seas adversely affected marine plant and animal life on the coast, and affected creatures that feed upon such?

482. **THE HERRING-GULL.**—Seen at York on December 17th (E.W.T.). A flock seen at Heslington (Y.D.) during hard weather in January (S.H.S.).

483. **THE SCANDINAVIAN HERRING-GULL.**—See Records of Ringed Birds.

485. **THE BRITISH LESSER BLACK-BACKED GULL.**—On June 3rd I noticed some 20 birds about the islands in Stock's Reservoir. At least one bird appeared to be sitting (R.C.). On July 1st, the late H. B. Booth paid a visit and only saw one bird. He was told by a local farmer that the species had tried to nest (as in 1940), but the eggs were taken. Bradford Naturalists report a bird that stayed at Esholt Sewage Works all through the 1940-41 winter. E. W. Taylor reports birds at York on August 28th, November 22nd, and December 28th, which may have been of this or of the type form.

486. **THE GREATER BLACK-BACKED GULL.**—Four were seen on Fly Flatts Reservoir on August 25th (H. Notes), and an immature bird at Swillington on September 28th. On December 27th a bird of this species flew over the road near Ferrybridge making for Fairburn Waters (R.C.). An adult and an immature bird together were in Thornton Marishes on November 18th (R.M.G.).

487. **THE GLANCOUS GULL.**—An immature bird at Scarborough on May 2nd (R.M.G.). In Scarborough harbour an adult on November 19th and on December 4th and 30th. An immature cream bird on

December 3rd, and a first year's immature bird on December 29th (W.J.C.).

489. THE KITTIWAKE.—The species continues to increase in numbers along the coast (W.J.C.).

493. THE ARCTIC SKUA.—A bird was seen above White Holme Reservoir on August 27th (H. Notes).

499. THE SOUTHERN GUILLEMOT.—On July 6th there were many more young birds visible than usually observed on ledges at Bempton, no doubt owing to less activity by the climbers (C. H. Wells).

502. THE LITTLE AUK.—A wing picked up at Sand Dale near Thornton Dale on March 1st was confirmed by Dr. W. E. Collinge as of this species (R.M.G.).

504. THE CORN-CRAKE.—In N.R. one killed by wire on migration at Ravenscar on May 14th (E.A.W.). Heard at Ayton for one day only on June 5th, at Everley in early July, and only one heard in the Whitby district in 1941 (W.S.M.). Much in evidence at Brigsworth and at Stokesley, and presumed to have bred, although no young were seen (A.S.F.). One was killed by a dog at Burton Constable (E.R.) during August (G.H.A.); and a few other birds were noted in the East Riding (C.F.P.). In the York district birds were heard at Sproxton on April 27th, at Tollerton on June 12th, at Naburn on July 2nd, at Clifton on July 7th (E.W.T.), and at Bramham on May 19th (K.G.P.). In the West Riding birds were heard at Addingham on July 11th (W.F.F.), at Bolton Percy on June 4th, and near Nun Appleton on June 22nd-23rd (W.G.B.); and near Sheffield on June 5th and several subsequent nights (C.H.W.). One crossed the road at Easingwold early in July (F.H.E.). A brood hatched near Helmsley (A. Gordon, per F.H.E.). The Yorkshire Naturalists' Union party at Whitsuntide heard a bird near Ingleton, of which the nest in nettles was seen subsequently, and the owner photographed by W. W. Nicholas, who later reported the presence of at least six other Corncrakes calling within two to three miles. The species seems to have been more in evidence than for some time past.

509. THE WATER-RAIL.—A bird was seen at Kelsey Hill on July 30th (G.H.A.). Six were at Keld Head, Pickering, on December 1st, a favourite winter resort (R.M.G.).

510. THE MOORHEN.—A. G. Parsons reports a decrease at Swillington in 1941 as compared with 1940, several dead birds having been found. In the county generally the species showed a considerable recovery from the effects of the great frosts of early 1940 (R.C.).

511. THE COOT.—The birds that arrived on the East Park Lake, Hull, during October, 1940, remained until March, 1941 (G.H.A.). Coots remain numerically the dominant species at Fairburn, and the crowd of several hundreds present on December 5th included numerous birds of the year (R.C.).

513. THE BRITISH BLACK GROUSE.—A grey hen was shot on Danby High Moor at the end of October, 1941 (W.S.M.).

514. THE BRITISH RED GROUSE.—Afforestation has almost driven the species away from the moors near Scarborough, but four birds were seen on November 3rd on Harwood Dale Moor, and occasional other birds were noted. On January 2nd, 1941, the species was present in the garden of C. H. Wells, well below the Sheffield Moors where they breed. In Ecclesall Woods, Sheffield, far below the moors, remains of three birds were found on March 13th (A.W.). No doubt severe weather was the cause in each case.

517. THE PHEASANT.—A bird squatting to avoid human observation on October 11th, 1941, laid its head on the rail at a level crossing near Thornton Dale. No doubt the bird was accustomed to passing trains, and it had its head severed (N. Garbutt, Postmaster, per R.M.G.). Pheasants have held their own fairly well in spite of lack of special preservation (G.H.A.).

518. THE COMMON PARTRIDGE.—A very good year is reported from the East Riding, probably helped by the dry weather of the hatching season and afterwards (G.H.A. and C.F.P.). At Bentley, near Doncaster, in February, with their habitat flooded, Partridges remained about, perching on posts and in hedges, and flying between them. One bird was found drowned (Rev. F.W.B.).

519. THE RED-LEGGED PARTRIDGE.—A bird was caught alive but exhausted in a Scarborough street on April 24th (W.J.C.).

520. THE QUAIL.—A bird nested in the garden of Escrick Hall, near York, and laid 14 eggs (Dr. J. Gaynor).

RECORDS OF RINGED BIRDS.

RECOVERED IN YORKSHIRE.

A RAVEN ringed as a nestling near Sedbergh by Sedbergh School on May 14th, 1939, was recovered in the winter of 1940-41 on Malham Moor (*British Birds*).

A BLACKBIRD ringed as adult at Belfast, N. Ireland, on February 14th, 1940, by J. Cunningham was recovered at Keighley on December 18th, 1940 (*British Birds*).

A KINGFISHER ringed as young at Wilmslow, Cheshire, on May 28th, 1939, by E. Cohen was recovered near Northallerton on March 31st, 1941 (*British Birds*).

A BLACK-HEADED GULL recovered near Tinsley, Sheffield, on February 26th, 1941, by Mr. R. Revill bore a ring inscribed 'Mus, Zoolog, Helsingfors, Finland C31138.'

A BLACK-HEADED GULL recovered at Killamarsh, near Sheffield early, in January 1941 by Mr. J. Marshall bore a ring marked 'Zoolog. Museum, Denmark Z31669.' The plumage of the latter bird denoted immaturity. Both records of this species came from Mr. J. W. Baggaley, of the Weston Park Museum, Sheffield.

A SCANDINAVIAN HERRING-GULL ringed in July, 1939, on Kharkov Island off the Murmansk coast was shot in Leeds on February 16th, 1940. The information from Moscow has reached Miss Leach recently (*British Birds*, XXXV, p. 160).

RINGED IN YORKSHIRE.

A ROOK ringed at Guiseley on April 21st, 1934, by C. Wontner-Smith was recovered at the same place on August 25th, 1941 (*British Birds*).

A STARLING ringed at Ackworth on February 2nd, 1940, as adult by A. Darlington was recovered at Northampton on January 9th, 1941.

Another STARLING ringed at Ackworth as above on February 17th, 1940, was recovered in Värmland, Sweden, on October 27th, 1940 (*British Birds*).

A MISTLE THRUSH ringed at York as a nestling on June 17th, 1939, by Bootham School was recovered near Doncaster on February 6th, 1941 (*British Birds*).

A SONG-THRUSH nestling ringed at Beamsley (two miles from Bolton Abbey) on May 2nd, 1939, was picked up dead in the Abbey grounds on May 3rd, 1941 (Rev. C.F.T.).

A KESTREL ringed as young at Buckden (Wharfedale) on June 19th, 1938, by T. Kerr was recovered at Kirkham (Lancs.) in November, 1939 (*British Birds*).

A LAPWING ringed as young at Ribbleshead on May 11th, 1939, by Messrs. Moon and Cooper was recovered at Stradbally, Queens County, on January 21st, 1941 (*British Birds*).

A LAPWING ringed as young at Bashall Eaves on May 21st, 1939, by Messrs. Oakes and Battersby was recovered at Pilling (Lancs.) on January 5th, 1941 (*British Birds*).

These Lapwing recoveries are referred to under the heading of the species in the Classified Notes.

The NATURALIST

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Edited by
I. PEARSALL, D.Sc., F.L.S., F.R.S., and W. R. GRIST, B.Sc.,
The University, Leeds.

with the assistance as referees in special departments of

J. M. Brown, B.Sc., F.R.E.S.
W. H. Burrell, F.L.S.
Chris A. Cheetham, F.R.E.S.
Ralph Chislett, F.R.P.S., M.B.O.U.
W. J. Fordham, M.R.C.S., L.R.C.P., D.P.H.

Mrs. A. Hazelwood.
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Thos. Sheppard, M.Sc., A.L.S.
W. A. Sledge, Ph.D.
H. C. Versey, D.Sc., F.G.S.

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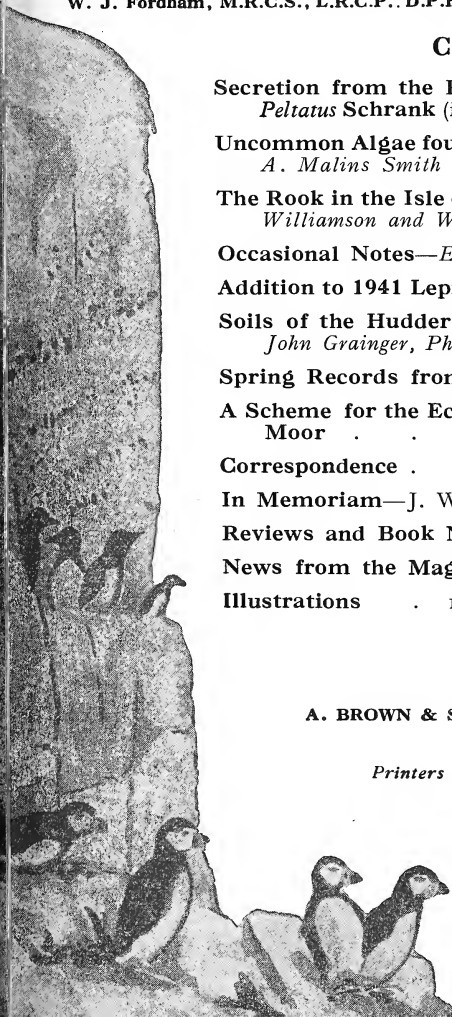
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The Future of *The Naturalist*

Members of the Yorkshire Naturalists' Union and other subscribers should note that owing to paper restrictions mentioned in the last issue it will be possible to publish only two issues before 1943, the current number and an Autumn number. In 1943 the Journal will become a regular quarterly published in January, April, July, and October. This change will hold good until the paper situation changes. The number of pages has been increased to 32 and in order to minimise as far as possible the difficulties which the restrictions in the use of paper are causing, smaller type and increased type areas are now being utilized.

SECRETION FROM THE PETAL NECTARY OF *RANUNCULUS PELTATUS* SCHRANK.

RUTH CUBITT, B.Sc.

DURING an investigation of the nectaries of *Ranunculus*, an interesting phase in the process of secretion was observed clearly in the species *R. peltatus* Schrank. Transverse and longitudinal sections of the petal base were cut by means of the microtome and stained in safranin and fast green.

The nectary lies round a pocket formed by a reduced scale which grows up on the inner surface of the petal near its base (Figs. 1a and 1b). The scale present here is much reduced

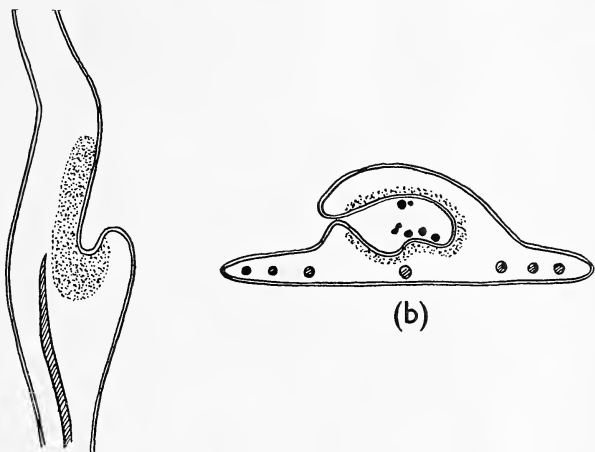


Fig. 1 (a)

(a) Diagram of a median longitudinal section through the petal nectary of *Ranunculus peltatus*, showing the reduced scale and the distribution of the nectary tissue.

(b) Transverse section through the nectary pocket showing the vascular strands in the petal, and pollen grains in the pocket.

and probably derived from types like *R. repens* L., in which the scales are large enough to be easily visible to the naked eye. The nectary of *R. peltatus* also differs from those of the yellow-flowered species in having no differentiated vascular tissue running to the secretory tissue or scale. The nectary tissue in *Ranunculus* is recognised by its small cells with dense cytoplasmic contents and large nuclei. The epidermal layer of the actual nectary consists of cells which are roughly pentagonal in surface view and in some species are papillated. Papillæ were found to be most distinct in *R. peltatus*, and the following description applies to this species.

It was noted that some of the cells on the surface of the nectary had burst and had released their contents through the

papilæ. As it was thought that this might be a mechanism for nectar secretion, further detailed examination was made. Apparently a breaking down of the nucleus accompanies the changes in the papillated cells and various stages of this process are illustrated in Fig. 2; the nucleus first acquires a strong affinity for the safranin and subsequently breaks down and is simply recognised in the cells as red-staining material. This material passes into the papilla and is finally released with the other cell contents when the papilla bursts. Before the papilla bursts a clear region appears at the tip (Fig. 2a) which is reminiscent of the receptive spot on the oogonium of such algæ as *Edogonium* and *Vaucheria*; it seems probable that the clear region is connected with the bursting process and is most likely due to the secretion and accumulation of mucilage in this position.

The dark marks at the tips of the papillæ shown in Fig. 2c are the only indication seen to suggest that a pore may be present, but even if this is so a more extensive rupturing of the distal part of the papilla occurs when the cell contents are finally released.

After these observations had been made, reference was found to similar observations by Bertha Mohr¹ on some of the yellow-flowered *Ranunculus* species. She states that a slit-like pore is present in the tip of the papilla and that in older flowers the cell contents are released through these; she did not determine whether the copious secretion which accompanies the beginning of anthesis is confined to the papillæ or not. From the present investigation it does not seem necessary to assume an alternative method of secretion; as soon as the flowers open groups of cells begin to burst and release their contents, and the bursting continues until nectar secretion ceases altogether. The bursting of the papillæ is probably due to a disturbance in the mechanism of sugar secretion when water is drawn into the cells in excess and causes bursting of the cells. In the present investigation the observations were made almost entirely during the winter on preserved material, so it is of interest that Bertha Mohr was able to observe similar stages when preparations from fresh material were mounted in high concentrations of cane sugar solutions.

In most species of *Ranunculus*, cambiform cells connect the secretory tissue with the vascular strands and are probably associated with the movement of sugars to the nectary, but

¹ Bertha Mohr. Observations described, without further reference, by Adolf Sperlich, 'Das tropische Parenchym,' in Linsbauer's *Handbuch d. Pflanzenanatomie*. Bd IV, Abt 1, Teil 2, p. 56. Berlin, 1939.

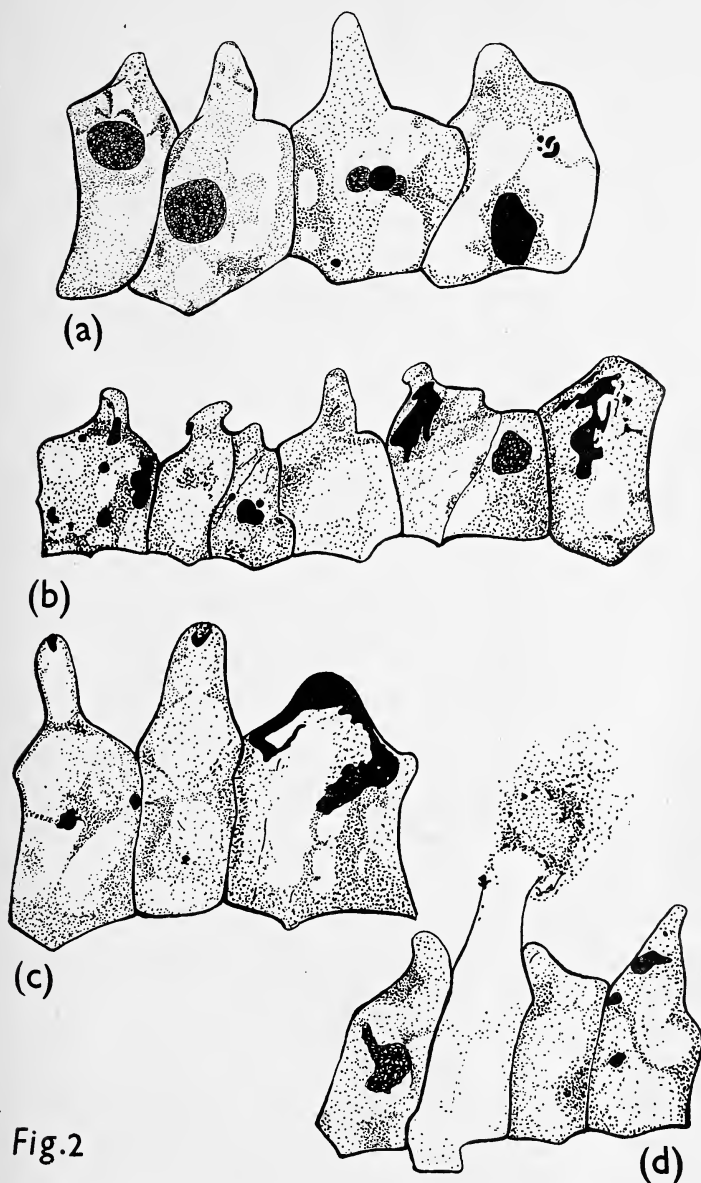


Fig.2

Ranunculus pellatus. Epidermal cells of the nectary tissue showing stages in the disintegration of the nucleus and (d) the bursting of a papilla to release the cell contents. (x between 1250 and 1750).

in *R. peltatus* there was an absence of both cambiform cells and vascular tissue leading to the nectary.

Pollen grains were commonly found germinating in the nectary pocket; the sugar solution secreted by the nectary is probably similar to that exuded from the stigmatic surface of the carpels.

UNCOMMON ALGAE FOUND IN THE BRADFORD DISTRICT

A. MALINS SMITH

DURING the summer of 1941 I found the following rare species of *Oedogonium*:

- O. echinospermum* A. Braun, was found at Baildon Low Hill, 14/6/41. I became acquainted with this species in 1930 from material collected in the Wyre Forest, Worcestershire, by my colleague, Mr. D. W. Shaw. The only certain previous record was from Cornwall. The three records now known, show that the species, though apparently rare, has a wide distribution. This is the first record for Yorkshire.
- O. crispum* Wittr. in a bog at Marley, 1/7/41. This species is new to Yorkshire. The only previous record in the country appears to be by Hassall from near Cheshunt.
- O. eyathigerum* Wittr. at Dowley Gap, near Bingley, 24/6/41, found only once previously in Yorkshire on Rawcliffe Common S.W.; only previously known in this country from Harefield, Middlesex.

F. Rich, in her account of the alga-flora of Leicestershire (*Journ. Bot.*, 1925), gave 23 species of *Oedogonium* for that county. This compares well with the 27 species given by the Wests for the far larger county of Yorkshire. It is therefore worth noting that two of the Leicestershire species, not then known in Yorkshire, have since been found in our county, viz.:

- O. rufescens* Wittr., first found by West at Austwick Moss, and recorded in *The Naturalist* of 1908, though it was not included in the Alga-Flora of Yorkshire, 1910, from which Rich took her Yorkshire list. I found it again in Miles Rough Bog, Bradford (*Naturalist*, 1927).
- O. rupestre* Hirn., found by me at Shipley (see the Annual Report in *The Naturalist*, 1936).

With the two species new to the county now recorded, this raises the Yorkshire total to 31 species. As the species of this genus seem to be found in condition suitable for identification only seldom, it is likely that further finds await diligent search in our county.

The Entomologist for March contains 'Spiral and other Abnormalities of Segmentation in Lepidoptera,' by E. A. Cockayne; 'Migration Records 1941,' by Capt. T. Dannreuther; 'A Note on European *Nepeira* Forster with the description of a new species (Hym. Ichneumonidae Ophioninae),' by J. F. Perkins; '*Cyrnus insolutus* McL. (Trichoptera) new to Britain,' by D. E. Kimmins, and numerous notes and observations.

THE ROOK IN THE ISLE OF MAN

Second Report, 1941

KENNETH WILLIAMSON AND W. S. COWIN
(Members of the Northern Ecological Association)

THE first report of the Manx Field Club's survey of the rookeries in their province (No. 71 of the Watsonian System) appeared in *The Naturalist* for November, 1940, pp. 271-282. The survey, which Manx field-naturalists took as their first serious piece of work on the formation of the club in 1938, was continued during the 1941 season, and the excellence of the work then done makes possible some comment on the state of the colonies.

A. H. Karraan again showed great energy in organising the field work, and he is very largely responsible for having rescued the survey from its lethargy of 1939, and for having brought it to its present healthy condition. In 1941 he was ably helped by Messrs. W. S. Cowin, G. Clementson, J. J. Gill, M. Glasman, E. F. Ladds, W. J. Mylrea, D. Kelly, W. Poole, H. A. Quillin, and Miss I. Cannell.

The recorders have revised the scheme under which the state of the colonies was presented in 1940, and have, subject to small modifications which were considered justifiable from an ecological standpoint, used the official plan of following the parishes round the coast from west through north to south-west. This method has the decided advantage—fortunately for Manx natural history—of not interfering overmuch with the main ecological divisions. Thus we are able to follow more clearly the progress of the rook population in the Northern Curragh and on the flat alluvial plain nearby, and to see better how, on the east coast, the birds are invading the contiguous townships of Douglas and Conchan. The connection between the settlements at the western end of the Greeba Gap, as far inland as the Vale of St. John's, and the distribution of the species over the fertile country between the sea and the southern hills, are both thrown into a better perspective.

In the following paragraphs the state of the rookeries in 1941 is summed up as tersely as possible, and the more noticeable changes from the 1940 position are commented upon. The towns are included in their appropriate divisions, and the figures of course all refer to 1941 counts. As the previous season's figures are not repeated it is essential that the two reports be read in conjunction.

1. PATRICK. General improvement south-west end Greeba Gap, especially Ballamoar (235), which extended to Patrick Vicarage (15). Ballacallin 100, Glenfaba 82, Brookfield (Foxdale) 56. Total of 599¹ shows return to 1938 strength.

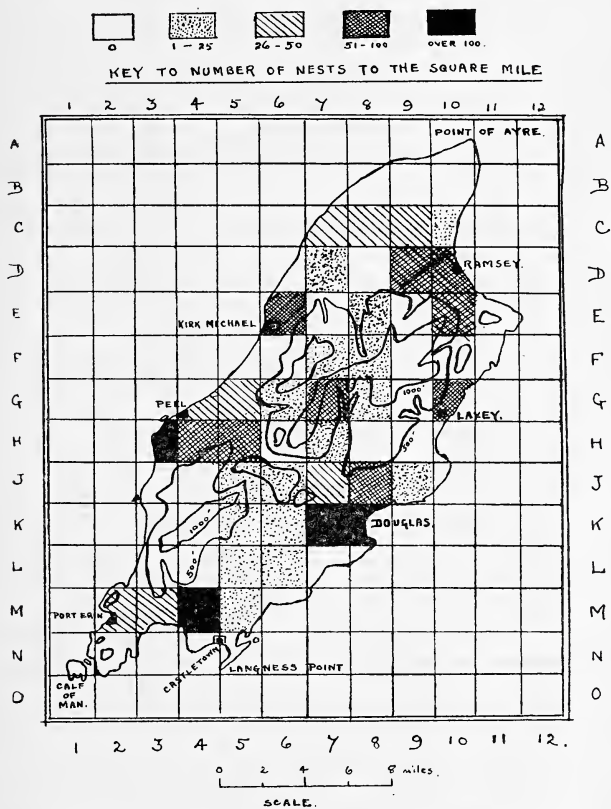
¹ Including Kennaa III.

2. GERMAN. Of Greeba Gap (agricultural land and Curragh waste) colonies Ballagaraghyn (43) probably absorbing birds from nearby Ballacraigne (82): Hawthorn Inn 4. West coast—Ballagyr Farms have decreased by half to 4 and 26; Lhergydhoo (102) continues to fall steeply. Vale of St. John's—Kenna (Patrick) 111 and Glyn Moar 86. Ballawattleworth 36, Ballaquane 25.
3. MICHAEL. West coast—Village 45, Whitehouse 100, Bishop's Glen 137 (Ballaugh), Orrisdale 21. Fall in total to 305 definitely attributable to weakening of hill-colonies; Little London 80, Montpelier 63, Lhergyrhenny 0, Tholt-y-Will (Lezayre), *c.* 50.
4. BALLAUGH. Rookeries bordering on Curragh fields and wastes south-west part of Northern Plain—Ballaugh Old Church 9; at Ballamona Beg (5) birds persecuted in spring and some may have moved to Ballacain (15).
5. JURBY. North-west fringe of Curragh—good increases, Ballacain 120, Ballamoar 46, Summerhill 128.
6. ANDREAS. Considerable increase Curragh-fringe and arable land of plain: Ballachurry 173, Ballasteen 2 (new site). Total a 59 per cent. increase on 1940.
7. BRIDE. Unsuspected colony of 43 nests in conifers, Orry's Mount.
8. LEZAYRE. All on south edge of Curragh: Ballakillingan 310, Ballakirka 50, and Milntown 52 are improved totals; Ballachrink 9, Thornhill 185, Bolivia Mount 50, Lezayre Road 5 (a new site). In Ramsey—St. Olave's 6, Court House 1, Ballure 0.
9. MAUGHOLD. Decrease by approximately 8.5 per cent. Ballaglass 133, Cardle Voar 20, Dhoon Vicarage 90, Folieu Farm 21, Folieu House 81, Glen Mona 0.
10. LONAN. Dhoon Quarry 0. Lower Laxey valley, no change—Minorca Hill 34, Glen 72. Improvement maintained in village, Christ Church and M.E.R. Station 142.
11. CONCHAN. Village colonies increasing—Nursery Hotel 135, St. Peter's 67, Seaview 135, Ballacurrie 3, Howstrake 0. Outskirts of Douglas—new group Governor's Bridge (4) and increase over 100 per cent. this side of town: Olympia 22, Falcon Cliff Glen 51, Summerhill 13. Others in town—Laureston 103, Woodside 26, Brunswick Road 17, Villa Marina 4, St. George's 2, Drill Hall 5, Derby Square 2 and Derby Road 14 (transference of pairs?).
12. BRADDAN. Fort Anne (Douglas Head) 36. Increases along Castle-town Road—Nunnery 267, White Hoe Cottages 14, White Hoe Fever Hospital 25 in conifers (offshoot of persecuted Nunnery colony some 5-6 years ago). Increases Pulrose House (63) and Quarter Bridge (80), but Peel Road groups (131) show steady diminution. Increases West Baldwin Valley—Ballamillaghyn 8, Ballig 9, Injebreck *c.* 220. Kirby *c.* 350, or 410, if contiguous group at Old Kirk Braddan is included. Harcroft 14, Springfield 14, Farmhill 5, Spring Valley 5, Mount Rule 10, Tromode 4, Snugborough 0. Ballacubbon re-established with 3. The only rookery of any size known to be unvisited in 1941 was Creg-y-Cowin in East Baldwin. This held 26 nests in 1939.
13. MAROWN. Greeba Gap beyond Kirby—The Groves (80) at Union Mills was previously unvisited; Ballafreer 76 and Crosby 9 show decline. Ellerslie 15.
14. SANTAN. Complete desertion Oatlands. Mount Murray 78.
15. MALEW. Uplands—Ballacallin (11) and Ballavarvane (99) substantially decreased. Ballasalla village (92) and Ballakew (94)

show considerable advance. Ballahick (1) disappearing, but neighbouring Station (8) or Ballaguaggan (18) may be absorbing birds. Sunny Orchard (18) and between last two new site Orrisdale Road (4). Derbyhaven Shore 13. Billown (270) visited for first time.

16. ARBORY. Castletown site moved to Bank Street (9). Low country to south insufficiently covered formerly—Bellabbey 97, Parville

MAP TO SHOW DENSITY OF ROOK POPULATION IN I.O.M.



and Ballaclague 145 (25 per cent. increase), Ballaash 2, Colby Glen 4 (both probably new).

17. RUSHEN. Ballachurry (34) greatly developed; Ballashillogue deserted. Port St. Mary—High Street 14, Cronk Plantation 65. Ballagawne 3. Bradda *c.* 20.

The main features to note are the considerable increase in population on the fringe of Douglas, especially the northern side; the decline in the strength of the hill colonies, and those of the southern uplands; and the general increase on the

southern lowlands and in the Curragh areas east of Peel and in the north.

No new rookery of appreciable size was started in 1941, but definite starts on new ground (as distinct from extensions of existing colonies) were made at Ballasteen (Andreas), on the Lezayre Road outside Ramsey, and at Governor's Bridge near the Douglas-Conchan boundary. Ballaash and Colby Glen are very probably new; Orrisdale Road (Malew) is admitted for the first time, but for three years has had a single nest.

Desertions were on a considerably greater scale, and at Oatlands (Santan), which had 68 in 1939 and 50 in 1940—and was also a winter roost—not a single nest was built. A bigger colony, Ballashilloague had 63 nests in 1939, but in 1941 the birds had moved to the nearby Bellabbey. The Dhoon Quarry, only established in 1940 with 11 nests, was also untenanted, and several smaller sites were found to be deserted.

At one site only was a colony re-established—Ballacubbon (3), at the top of Richmond Hill, Braddan.

The number of colonies now recognised is 114 as against 110 in the previous year. Now that several previously unvisited colonies have been covered, the average size works out much higher than the figure given in the 1940 report, and is 57.2 nests. There are now two rookeries of over 300 and four of over 200 nests; indeed Kirby, which remains the largest, just tops the 400 if Old Kirk Braddan churchyard, immediately adjoining, is included. Ballakillingan (Lezayre) 310, Billown (Malew) 287, The Nunnery (Douglas) 267, Ballamoar (Patrick) 250, and the hill-foot colony at Injebreck (*c.* 220) are next in order.

One new tree may be added to the list of those used by rooks in the Island—the Chilean Pine, or 'Monkey-Puzzler'—and nests were built in this species at three rookeries, Mount Murray (Santan), Ballakillingan, and the Lezayre Road.

The grand total for 1941 works out at 6,524 nests compared with 5,368 in 1940 and 5,736 in 1938. Owing to the discovery of some hitherto overlooked rookeries some adjustments are necessary before a proper comparison can be made.

Bolivia Mount (Lezayre), The Groves (Union Mills), Orry's Mount (Bride), Billown (Malew), and the White Hoe Hospital (Braddan) were all unknown in 1940, and their combined total of 582 must therefore be taken from the 1941 total, leaving 5,942. Similarly, since Ballakew and Derbyhaven (Malew), and Bradda and Ballagawne (Rushen) were omitted from the count in 1940, the total must be further reduced to 5,812 before a fair comparison can be made.

This figure, then, represents the total for rookeries counted also in 1938 and 1940. Taking the 1938 figure as an index

and calling it 100, the index figures for 1940 and 1941 are 93.7 and 100.1 respectively. This shows that the rooks have recovered from their 1939-40 setback and are equally numerous as in 1938. This rapid recovery is surprising in view of the harsh weather conditions which prevailed during the winter of 1940-41, especially when it was thought that the somewhat severer conditions of the previous bad winter were to blame for the marked decrease noted in the 1940 population. It should perhaps be added that the agricultural figures for 1940 show an increase in the acreage of arable land equal to 3 per cent. of the 1939 figure. Data for the Isle of Man given in the table on p. 277 in the previous report should now read :

I.M. 227 ... 6,524 ... 114 ... 2817 ... 2 ... 12.

The attention of members of the Club has been drawn to the paucity of information on hand respecting the roosts, and it is hoped that this matter will receive attention during the coming winter.

In conclusion it should be said that early in 1941 the Governor issued an Order under the Emergency Regulations by which notice was served on all owners of land embracing rookeries ordering them to shoot over the colonies, and permitting authorised persons to enter upon such land for this purpose. It is doubtful, however, if any more rook-shooting took place in 1941 than in previous years. Certain rookeries, usually large ones, are shot over annually, but one result of the order may be that persecution will not in future be so localised. It will be interesting to see what changes, if any, are borne out by the survey in the spring of 1942.

OCCASIONAL NOTES

E. WILFRED TAYLOR

ON February 23rd Mr. F. Jefferson, of Haxby, was out with his dog when the latter discovered a live Red Throated Diver in a dry ditch near some telegraph wires. He managed to get it into a sack, and it was later examined by Dr. Gayner and the writer. The bird appeared unhurt and was, of course, in winter plumage ; the head and upper neck were slim without that inflated appearance seen in the nesting season, and the ruby iris shone like a jewel.

It was decided to release the bird in a quiet stretch of the River Foss. On taking it out of the sack it made no attempt to walk but sat on the ground, croaked and vigorously attacked the sack, holding on so strongly with its slightly upturned beak that it was by this means dragged to the water's edge. On entering the water it wagged its tail, stretched its wings, preened itself and took a few sips of water without attempting to swim away. It then took two or three trial dives, entering

the water with the slightest possible disturbance of the surface. When last seen it was some fifty yards upstream and appeared quite normal.

It seems possible that it struck the telegraph wires with sufficient violence to bring it to the ground, and that it was then unable either to walk or take wing. It is a bird marvellously adapted for life in and under the water, but on land it is almost helpless owing to the extreme position of the legs, and it also has difficulty in taking wing even when it can run along the surface of the water.

Of late one has become accustomed to the sight of a few Black Backed Gulls around York, and on February 15th a very large gull of this description was seen to alight on the frozen floods on Clifton Ings to join a party of Common and Black Headed Gulls. As it folded its great wings it was noted that the legs were pink in colour and not yellow, and a moment later it went through the ice. It soon lifted itself into the air again and alighted a few yards away; then it again went through, and this time re-alighted on the land. This is the first time the writer has seen the Greater Black Backed Gull near York, but owing possibly to the reduction in the numbers of fisheries and of the quantity of fish offal available on the coast, gulls of all species, even including the Kittiwake, are coming inland much more than they did before the commencement of the war. Perhaps this tendency has been noted in other parts of the county.

ADDITION TO 1941 LEPIDOPTERA REPORT

The following records of Lepidoptera were received from Mr. G. B. Walsh, of Scarborough, and constitute a useful addition to the 1941 Report of the Lepidoptera Section.

C. alpenor larvæ have been common in the Scarborough district, one *C. croceus* has been seen in the neighbourhood, and two at Pickering by Mr. E. G. Highfield. After the enormous swarms of larvæ last year White Butterflies have been only moderately common, and *V. urticæ* and *V. atalanta* have been in only small numbers, and *V. cardui* rare. *P. phloas* has been common. Larvæ of *T. w-album* have occurred in another valley in the Kirby Moorside area. No night work has been possible, of course.—E. DEARING.

The Entomologist's Monthly Magazine for February contains 'The Aquatic Coleoptera of East and West Sussex,' by F. Balfour-Browne; '*Myopopone wollastoni* sp. n. with notes on other Forms in the Genus, and Descriptions of the Males of two Species (Hym. Formicidæ),' by H. Donisthorpe; '*Clypeoaphis suaedæ* Soliman—a Genus and Species of Aphididæ (Hem.) new to Britain,' by C. T. Gimmingham (with plate) (Newquay, Cornwall). 'A Note on *Cryptus infumatus* Thomson (Hym. Ichneumonidæ)' by J. F. Perkins; 'Mound Building of the Ant, *Lasius flavus* F.,' by W. Pickles (at Thornhill, Yorks.); 'How does a House Fly alight on the Ceiling,' by K. G. Blair; 'The Date of Publication of the *Monographie des Gomphines de Selys*,' by Lt.-Col. F. C. Fraser; plate of *Cerylon primroseæ* sp. n. and *C. ferrugineum* Steph.; and numerous shorter notes.

SOILS OF THE HUDDERSFIELD DISTRICT

(Continued from page 90)

Ecological indications of the presence of these calcareous

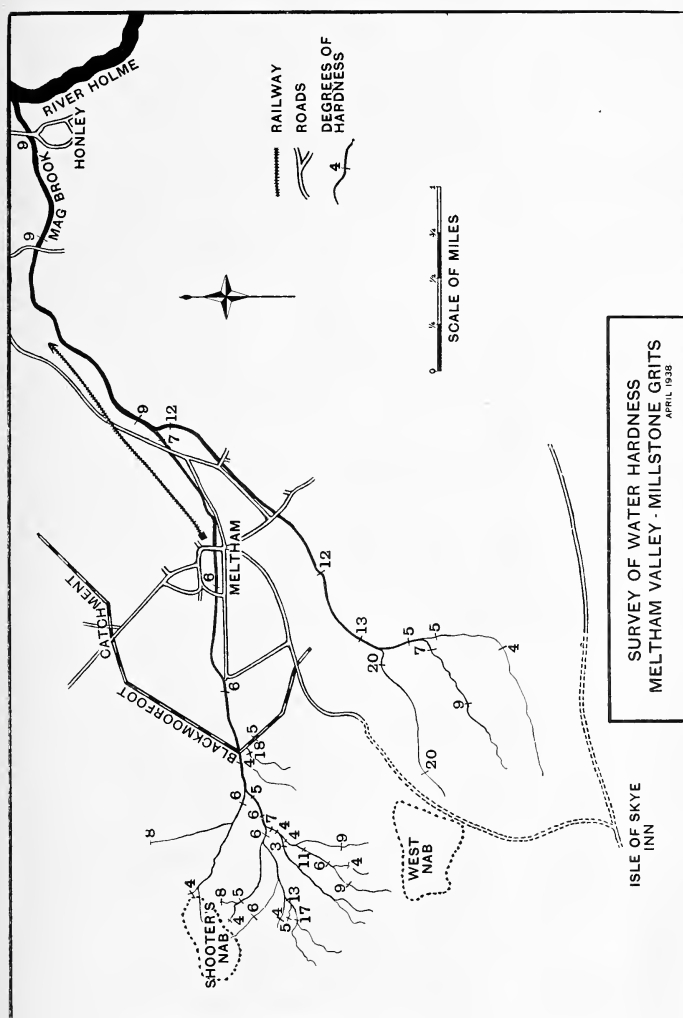


Figure 7

pockets are occasionally seen at the surface. One spring in Raikes Dyke before it was covered by the present reservoir had a hardness of 12° and supported a flora of the moss *Hypnum commutatum*, which is usually found in the waters of limestone districts. Another spring at Drop Clough, Slaithwaite, has a

similar hardness and supports a very luxuriant mat of the same moss.

Another general indication of the deficiency of soil bases on the Millstone Grits is provided by Comber's test, where the soil is shaken up with a little potassium thiocyanate in saturated alcoholic solution. This is really a test for iron which, however, does not come into solution if certain other soil bases are present. It can be made roughly quantitative by judging the depth of the red colour produced, and Table 6 gives some results with this test :

TABLE 6.—RESULTS OF COMBER'S TEST FOR DEFICIENCY OF SOIL BASES.
MILLSTONE GRIT SOILS.

Sandstones

Soil from Kinder Scout Grit, Dean Head, Scammonden	4
Soil from Midgley Grit, Lower Royal George, Scammonden	4
Soil from Scotland Flags, Dean Head, Scammonden	4
Soil from Huddersfield White Rock, Dean Head, Scammonden	4

Shales

Soil from shale under Beacon Hill Flags, Ramsden Beck, Meltham	3
Soil from shale under Huddersfield White Rock, Dean Head, Scammonden	4
Soil from shale under Rough Rock, Meltham Cop	4
Soil from shale under Scotland Flags, Dean Head, Scammonden	3

COAL MEASURE SOILS.

Sandstones

Soil from Grenoside Rock, Farnley Top	0
Soil from Elland Flags, Kirkheaton	0
Soil from Clifton Rock, Bradley Park	1

Shales

Soil from shale under Elland Flags, Penny Spring Wood, Lowerhouses	4
Soil from shale under Elland Flags (middle), Benholmley	1
Soil from Grey Shaley Mudstones, Roydhouse, Almondbury	1
Soil from shale below Elland Flags, Dalton Bank	3
Soil from shale below Elland Flags, Castle Hill	2

GLACIAL LAKE DEPOSIT SOILS.

Albany Road, Dalton, 18 in. deep	0
Do. do. 3 ft. deep	1
Round Wood, Waterloo (' Brick earth ')	0

ALLUVIAL SOILS.

Dean Head, Black Brook	3
Bradley, River Calder	1

4 = Very deficient in soil bases.

0 = Not deficient in soil bases.

Other figures represent roughly quantitative intermediate states.

The following analyses* also show the relative deficiency of soil bases in the Millstone Grits as compared with the Coal Measures :

MILLSTONE GRIT SERIES.

1. *Analysis of water from borehole into the Huddersfield White Rock at Honley.*

Silica	0.56	grains per gallon.
Magnesium carbonate	0.36	„ „
Sodium carbonate	38.92	„ „
Sodium chloride	4.74	„ „
Sodium sulphate	0.18	„ „

Hardness : Calculated equal to 0.47 grains of calcium carbonate per gallon.

COAL MEASURE SERIES.

2. *Analysis of water from borehole to the Soft Bed Flags, New Peace Pit, Leeds Road, Huddersfield.*

Silica	2.10	grains per gallon.
Ferric sulphate	17.50	„ „
Calcium sulphate	51.00	„ „
Magnesium sulphate	20.37	„ „
Sodium sulphate	27.26	„ „
Sodium chloride	9.68	„ „

Hardness : Calculated equal to 54.47 grains of calcium carbonate per gallon.

The relatively large amounts of calcium and magnesium sulphates in the Coal Measures water are in marked contrast to the minute amount of magnesium and the absence of calcium from the Millstone Grit, and give additional evidence of the poorer supply of soil bases in the latter.

‘TRACE ELEMENTS.’

It has been stated that nitrogen, phosphorus and potassium are likely to be deficient in soils, but modern research has shown that if any one of a large number of chemical elements is completely absent from the soil, growth of several plants will be unsatisfactory. Such chemical elements are only required in extremely small amounts, and are known as ‘trace elements.’ Boron, copper and nickel are but three examples, and minute traces of gold have even been found in the ash of the common field horsetail, *Equisetum sylvaticum*. There is not, however, sufficient to tempt any fellow Yorkshireman.

* ‘The Geology of the Country around Huddersfield and Halifax,’ *Memoirs of the Geological Survey of England and Wales* (Sheet 77), 1930 by D. A. Wray, J. V. Stephens, W. N. Edwards and C. E. N. Bromehead.

The only evidence of lack of any 'trace element' in the Huddersfield district concerns the element boron. Lack of this substance causes a condition of the swede crop known as

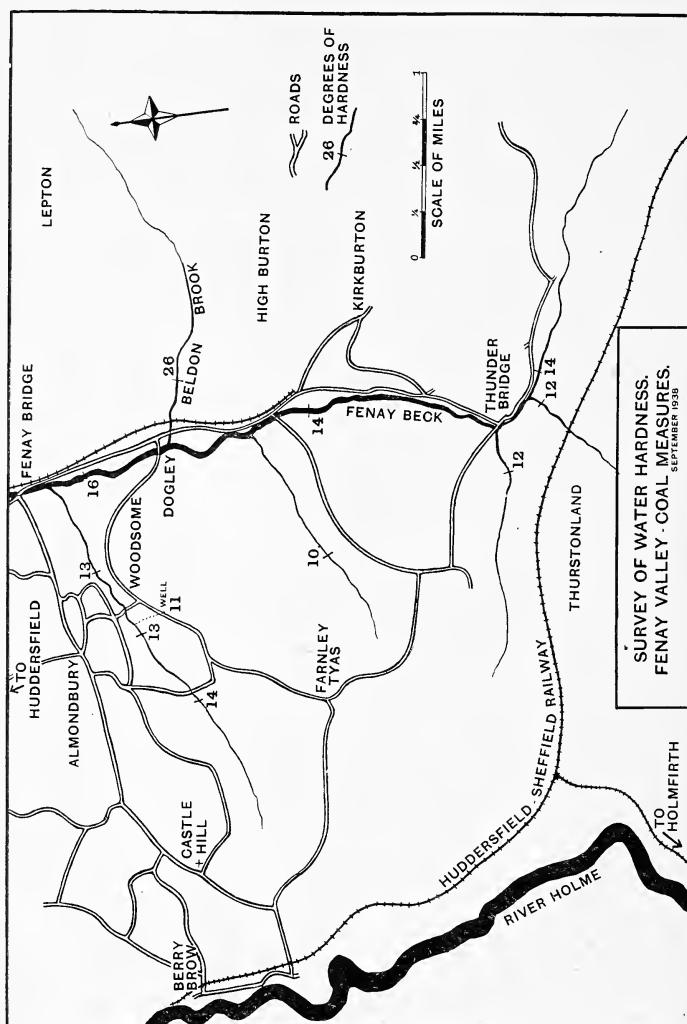
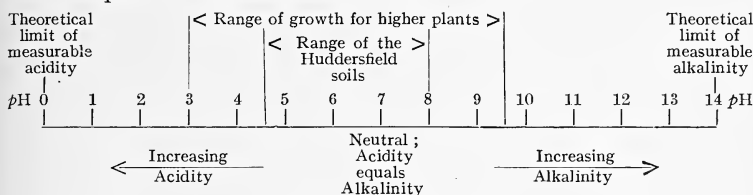


Figure 8

heart rot. Diffuse brown patches appear in the flesh when the root is cut. It has been controlled successfully by watering with a solution of 1 oz. of borax to 3 gall. of water when the plants were established.

RELATIVE ACIDITY (pH).

The relative acidity or alkalinity of the soil has perhaps the most potent effect upon natural plant distribution of any single factor in the environment. It is measured on a scale of 14 units denoted by the symbol pH , where $pH1$ is the strongest acid and $pH14$ the strongest alkali, with $pH7$ the neutral point between them :



The divisions on this scale are not, however, equal in value, for each mark an increase or decrease of ten times that of its neighbour. Thus $pH5$ is ten times more acid than $pH6$, and $pH4$ is a hundred times more acid than $pH6$. Values above $pH7$ are alkaline, and $pH9$ is ten times more alkaline than $pH8$, whilst $pH11$ is a thousand times more alkaline than $pH8$. Intermediate values between two units are shown by a decimal point. Most farm and garden soils fall between $pH4$ and $pH8$, and the extreme limits for growth of higher plants in England are probably about $pH3.0$ and $pH9.5$. More than a thousand tests of soil acidity made in the Huddersfield district show that the most acid is $pH4.5$ and the most alkaline $pH8.0$.

Most plants favour soil with a particular range of pH and Table 7 gives some indication of the requirements for several species.

TABLE 7.—RANGE OF SOIL ACIDITY MOST FAVOURED BY DIFFERENT PLANTS.

	pH		pH
Cabbage family . . .	6.5—8.0	Tomatoes	5.0—6.5
Pea and Bean family . .	6.5—7.5	Bent and Fescue grasses	3.0—5.0
Potatoes	5.0—7.5	Common Daisy	6.0—7.5

RELATIVE ACIDITY AND ROTATION.

One of the tasks of the cultivator is thus to provide a suitable pH in his soil for the crops which he desires to grow. He can make his ground more alkaline or less acid by applying lime, and he can make his ground more acid or less alkaline by growing certain crops and by applying organic matter. Tables 10-12 show the extent to which these changes can be accomplished. It is also a matter of good practice to adopt some form of rotation, so that the crops which follow one another upon any plot of ground can be adapted to the particular conditions of relative acidity. The problems of the

gardener and farmer are different, because of the various kinds of crops which they grow. The following rotation has been found most suitable for allotment crops in the district :

<i>This year</i>	<i>Next year</i>	<i>Third year</i>
1 Cabbage family.	2 Pea family and General Crops.	3 Potatoes.
2 Pea family and General Crops.	3 Potatoes.	1 Cabbage family.
3 Potatoes.	1 Cabbage family.	2 Pea family and General Crops.

Here Plot 1 is limed according to the relative acidity :

TABLE 8.—RATES OF LIMING FOR CROPS OF THE CABBAGE FAMILY.

	<i>lb. of lime per sq. yd.</i>
Very acid soils (below pH 5.0)	1 $\frac{1}{4}$
Moderately acid soils (between pH 5.0 and 6.0)	1
Slightly acid soils (between pH 6.0 and 7.0)	$\frac{3}{4}$
Neutral or slightly alkaline soils (above pH 7.0)	$\frac{1}{4}$

It is suggested that when the rotation is established, only that part of an allotment devoted to the Cabbage family should be limed at the above rates. If a new plot is broken, however, lime should also be applied to the other sections for the first year only, at the following rates :

TABLE 9.—RATES OF LIMING FOR A NEW PLOT.

	<i>lb. of lime per sq. yd</i>
<i>The pea family and general crops.</i>	
Very acid soils	$\frac{3}{4}$
Moderately acid soils	$\frac{1}{2}$
Slightly acid soils	$\frac{1}{4}$
Neutral or slightly alkaline soils	nil
<i>Potatoes.</i>	
Very acid soils	$\frac{1}{4}$
Moderately acid, slightly acid and neutral or slightly alkaline soils	nil

This method of liming makes the soil sufficiently alkaline for the good growth of the Cabbage family, and also makes soil conditions unsuitable for Finger and Toe disease of this crop. Cabbages and allied plants nearly always leave the soil considerably more acid than it was before their growth. Table 10 shows the greatest difference yet recorded.

TABLE 10.—CHANGES IN RELATIVE ACIDITY CAUSED BY BRASSICA CROPS.
(Allotment of Mr. C. Dightam, Red Doles.)

	<i>Before planting</i>	<i>After removal of crop</i>
	pH	pH
1940	7.2	6.3
1941	7.3	5.8

Land following crops of the Cabbage family is thus slightly acid, and this brings conditions of a suitable relative acidity for leguminous crops, as in 2 of the above rotation. Other allotment crops, such as parsnips, beetroot, celery, leeks and onions, are included in this section, and none of them appears to leave the soil much more acid than it was before (Table II).

TABLE II.—EFFECT ON RELATIVE ACIDITY OF LEGUMINOUS AND OTHER CROPS.

(Allotment of Mr. C. Dightam, Red Doles.)

		<i>Before planting</i> <i>pH</i>	<i>After removal of crop</i> <i>pH</i>
1940	. .	5.7	5.7
1941	. .	6.8	6.8

The third section of the rotation is devoted to potatoes, and here the emphasis is upon the addition of organic matter for the control of Common Scab disease rather than the attainment of a particular relative acidity in the soil. Potatoes will grow successfully in soils between $pH5.0$ and $pH7.5$, but the control of Common Scab demands the presence of organic matter in a fairly advanced stage of decomposition. The ground should therefore be well manured, or have sods, lawn cuttings, leaves or any other source of rough organic matter added to the soil as soon as possible in the autumn before the crop is to be grown. It is important that the organic matter be dug in early enough to allow it to decay considerably by the time the potatoes are developing; raw, undecayed organic matter does not control Common Scab. It is frequently observed that potatoes are freer from scab in the second year of cultivation from grassland than in the first year, and this appears to be closely correlated with the state of the turf. It is not properly broken down until the second year of cultivation. Similarly, a dry year delays the decay of organic matter in soil, and thereby fails to control the Common Scab disease.

The potato crop does not change the acidity of the soil to any appreciable extent:

TABLE 12.—EFFECT ON RELATIVE ACIDITY OF THE POTATO CROP.
(Allotment of Mr. C. Dightam, Red Doles; Glacial Soil.)

	<i>Before planting</i> <i>pH</i>	<i>Intermediate treatment</i>	<i>After harvesting</i> <i>pH</i>
1940	. 6.5	General fertilizer added	6.8
		2 oz. per sq. yd.	
1941	. 6.3	Do. with basic slag	7.0

The rotation outlined above is the best practical and theoretical attempt to make soil conditions best for the three groups of plants and worst for two of the most prevalent

diseases in the district. It borrows its inspiration from ecological studies of natural plant distribution, and it works in practice for all types of local soils.

CHANGES IN SOIL ACIDITY.

The urban conditions of the district are responsible for a consistently acid atmosphere and for an acid deposit equivalent to just over 7 tons of sulphuric acid per square mile per year. This, however, really represents a very small amount when considered in relation to the total volume of soil. An acre of soil slightly less than 7 in. deep weighs 1,000 tons, and 1 square mile of soil considered at a fair depth of ploughing would contain 640,000 tons. The addition of 7 tons of sulphuric acid to this large amount would not be expected to cause a very great difference, and there is an additional factor that the soil is usually 'buffered,' that is, the addition of relatively large amounts of acid (or alkali) do not greatly change the pH or relative acidity.

The deposit might also be compared with the rates of addition of artificial fertilizers. Seven tons upon 640 acres would work out at about 20 lb. per acre, which is a very low dressing for any of the artificial manures usually added. It is unlikely, therefore, that the deposit would cause any appreciable alteration in the relative acidity of the soil in one year, but the urban conditions of the district have been in existence for about a century, and there is ecological evidence that the soils of the Huddersfield district are considerably more acid than they were at the beginning of the nineteenth century. James Bolton, who studied the fungi of the Halifax district in the years before 1789, mentions the edible Morrel fungus, *Morchella esculenta*, as being fairly common in the cloughs of the district at that time. My own research shows that this species requires a neutral or slightly alkaline soil (pH 7.0 to 7.5), but the cloughs have now soil of considerable acidity (pH 4.5 to 6). There were also several earlier records of the occurrence of Stone Bramble, *Rubus saxatilis*, which usually succeeds best on slightly alkaline soils. Many other records support this idea, and indeed, if a list (Table 13) is prepared of those plants which grew in this district before 1878 (1) but do not occur at present, it provides a flora which is in every way typical of the limestone areas of Yorkshire at the present time. The disappearance of these earlier recorded plants which prefer neutral or slightly alkaline soils coincides well with the idea that the urban deposit of acid material has had a considerable effect upon the general soil acidity in the district over a long period of years. The acid deposit upon the foliage of growing crops

makes the use of Bordeaux mixture dangerous, owing to its scorching action upon the acid-coated leaves.

TABLE 13.—PLANTS RECORDED IN THE HUDDERSFIELD DISTRICT BEFORE 1878, BUT NOT FOUND AT PRESENT.

<i>Actæa spicata</i>	. . .	Bane-berry.
<i>Aquilegia vulgaris</i>	. . .	Columbine.
<i>Campanula hederacea</i>	. . .	Ivy-leaved bell-flower.
<i>Centaurea calcitrapa</i>	. . .	Common star-thistle.
<i>Convallaria majalis</i>	. . .	Lily-of-the-valley.
<i>Draba incana</i>	. . .	Whitlow-grass.
<i>Epipactis latifolia</i>	. . .	Broad-leaved helleborine.
<i>Erodium cicutarium</i>	. . .	Storks-bill.
<i>Erythræa centaurium</i>	. . .	Centaury.
<i>Galanthus nivalis</i>	. . .	Snowdrop.
<i>Genista tinctoria</i>	. . .	Dyer's green-weed.
<i>Gentiana campestris</i>	. . .	Field gentian.
<i>Geranium phæum</i>	. . .	Dusky crane's-bill.
<i>Gnaphalium dioicum</i>	. . .	Cudweed.
<i>Habenaria bifolia</i>	. . .	Butterfly orchid.
<i>Humulus lupulus</i>	. . .	Hop.
<i>Inula dysenterica</i>	. . .	Fleabane.
<i>Jasione montana</i>	. . .	Sheep's-bit.
<i>Listera cordata</i>	. . .	Tway-blade orchid.
<i>Mercurialis annua</i>	. . .	Annual mercury.
<i>Meum athamanticum</i>	. . .	Spiguel.
<i>Ornithopus perpusillus</i>	. . .	Bird's-foot.
<i>Paris quadrifolia</i>	. . .	Herb Paris.
<i>Pyrola minor, P. media</i>	. . .	Winter-green.
<i>Ruscus aculeatus</i>	. . .	Butcher's broom.
<i>Sanicula europæa</i>	. . .	Sanicle.
<i>Saxifraga granulata</i>	. . .	Granular saxifrage.
<i>Saponaria officinalis</i>	. . .	Soapwort.
<i>Trientalis europæa</i>	. . .	Chickweed wintergreen.

CROP FAILURES DUE TO SOIL ACIDITY.

Certain crops, particularly carrots and beetroot, fail to grow in the more acid soil, but flourish upon the less acid ground. The greatest acidity tolerated by these crops appears to be about $pH5.3$, but several cases of soils more acid than this have been found. The other factors of fertility appeared to be the same, so that the failure of these crops can only be assigned to the greater acidity. It is interesting to recall that the wild ancestors of these plants favoured the more alkaline types of soil.

One factor which may explain the low acidity in certain restricted patches of an allotment may be the drifting of snow. It is a matter of common experience that when snow-drifts melt there is often a considerable layer of sooty material concentrated upon the ground. This would mean the addition of a relatively large quantity of acid to the ground at one time, and would be expected to disturb the usual 'buffering' of the soil; the addition of large quantities of acid can alter the pH where small quantities would not disturb it. Actual

trials confirm that this state of affairs is occasionally found, for one allotment, subject by its position to the drifting of snow, was found to have a very variable pH . In one row across the allotment the pH varied from 4.8 to 5.8, and this had a direct effect upon the growth of carrot and beet, as mentioned above.

The obvious remedy for such a condition is the addition of lime, and if the grower has any doubt about the acidity of his soil, advantage may be taken of the free soil testing service of the Ravensknowle Museum, or Greenhead Park. Gardeners in the Holme Valley may also send samples for testing to Mr. C. Ridgwick, 6 Lower Fold, Honley. Samples should be representative of the whole plot of soil whose acidity is desired, and a double handful should be wrapped in clean paper.

‘ REDOX ’ OF THE SOIL

Several cases were observed in 1941 where carrots and beet had failed to grow, and where peas and other leguminous crops were poor. The areas of failure were fortunately not very large, but were sufficient to curtail allotment supplies. They did not appear to suffer from any of the usual deficiencies of plant nutrients, and were not subject to extreme acidity, as mentioned earlier. Estimations of the reduction-oxidation potential (‘Redox’ for short) were made, and it was found (Table 14) that some soils where carrots and beet had failed had a low ‘Redox’ and where they grew satisfactorily the ‘Redox’ was invariably high. Reduction-oxidation potential is a measure of the electrical state of the soil indicating the chemical condition of several substances significant for plant growth. It is somewhat complicated in conception, but in practice it is simply a measure of the availability of soil nutrients, particularly nitrogen. It varies with the relative acidity (pH) of the soil, and for purposes of comparison it is useful to express the ‘Redox’ (E_h) as it would be at $pH 5.0$ (E_5). ‘Redox’ is expressed in millivolts, and soils with an E_5 below about 350-400 millivolts appear to be liable to the failure of carrots and beet.

Practical treatment does not appear difficult, though it should be frankly admitted that very little is as yet known about this condition. Cultivation may improve matters, by the mere fact of opening up the ground, and the addition of lime also appears to increase the ‘Redox.’ Attempts to increase the oxidation-reduction potential by the direct addition of an oxidizing agent (potassium permanganate) achieved the desired end, so far as the theoretical consideration was concerned, but did not appear to improve growth conditions in practice.

TABLE 14.— ' REDOX ' AND CROP FAILURES.

<i>Locality.</i>	<i>Type of Soil.</i>	<i>Condition of Crops.</i>	<i>E_h Millivolts.</i>	<i>pH</i>	<i>E_s Millivolts.</i>	
Sheepridge	Coal Measures shale.	Beet failed	44	6.8	148	E _s below 400 millivolts ; crop failures.
Acre House Allotments, Lindley.	Coal Measures sandstone.	Beet failed	282	5.9	334	
Rumbolds Rd. Marsh.	Do.	Peas, Kidney Beans, Runner Beans, and Cabbages failed	339	5.3	356	
Reinwood Allotments.	Coal Measures sandstone.	Beet and Carrots failed	379	5.3	396	
Reinwood Allotments.	Coal Measures sandstone.	Beet and Carrots satisfactory	462	5.7	503	E _s above 400 millivolts ; crops satisfactory.
Ravensknowle	Glacial	Beet satisfactory	458	7.0	574	
Acre House Allotments.	Coal Measures sandstone.	Beet satisfactory	531	7.4	670	
Rumbold Rd. Marsh.	Do.	All satisfactory.	688	5.7	729	

CLIMATIC CONDITIONS

THE TEMPERATURE OF THE SOIL.

The average temperature of the surface layers of the soil (from the surface to 1 ft. depth) is not very greatly different from the average air temperature (Fig. 9). The deeper layers, however, show a somewhat greater difference. The temperature at 4 ft. is never so low in winter nor so high in summer as the surface layers, and there is usually a lag of about a month between the minimum and maximum temperatures of the surface layers and those at 4 ft. The lowest temperature of the surface layers of soil is reached in January and that at 4 ft. depth in February, whilst the maximum temperature at the surface is attained in July and soil at the greater depths does not reach its highest temperature until August. The deeper layers are thus warmer than the shallower parts until about the first week in April, when the lower layers remain cooler than the surface layers until the first week in September. It will also be seen from Fig. 9 that the lower layers of soil are warmed by the increasing temperatures of spring and summer much less than the surface layers, and it is noteworthy in this connection that the surface layers have a higher average temperature than that of the air, for a very substantial part of the year, namely from the beginning of March to the end of December. This is due to the warming effect of radiation from the sun. The general agreement between the graphs denoting the intensity of sunshine and the graphs showing temperatures of the air and soil is very noticeable in Fig. 9. There is also the effect of evaporation from the surface of the soil which

tends to lower the temperature there (inset on Fig. 9, June to August). The evaporation is dependent on relative humidity, which is shown in Fig. 9. The lowering effect of evaporation

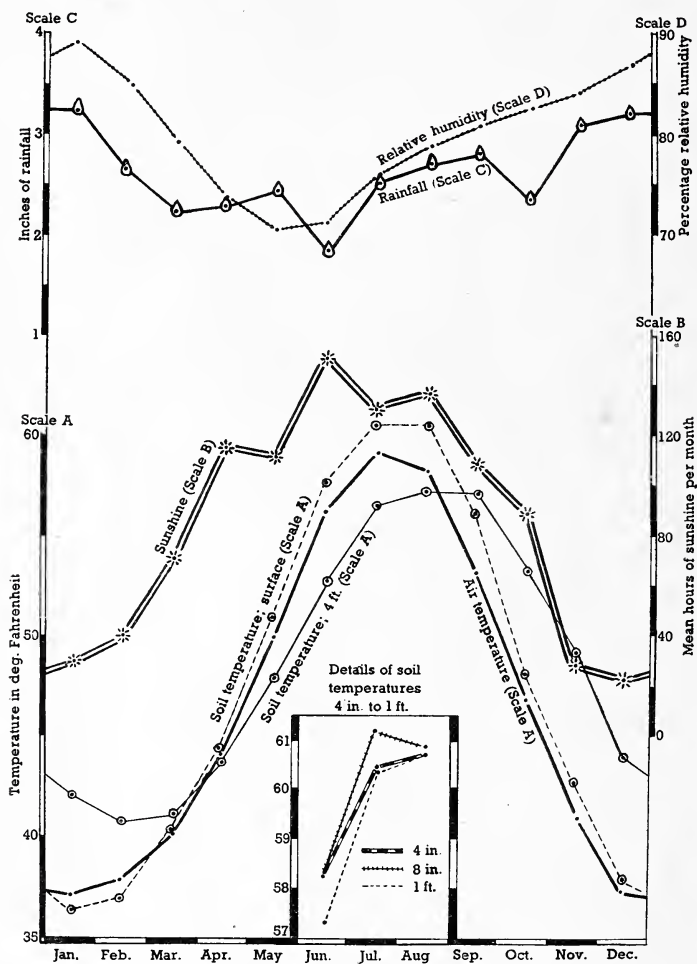


Figure 9

Soil temperatures and other meteorological data, Ravensknowle Museum. Glacial soil.

on temperature would be expected to take place all through the year, but would be greatest in May and June when the relative humidity of the air is low. It does not appear, however, that this effect is very considerable, for the differences in average temperature between the layer at 4 in. and the layer at 8 in. are never very great, and in the inset of Fig. 9,



Figure 10

Average distribution of annual rainfall in the Huddersfield district.

which depicts the greatest difference found, it only amounts to an average of 0.7° F.

It is probable that the temperatures of the surface layer, which are lower than the air temperature in January and February, can be accounted for by the prevalence of snow and ice, which prevent radiation from the sun from reaching the soil. There is no foundation in the Ravensknowle records for the idea that a covering of snow keeps the soil warmer—the activities of the micro-organisms do not appear to contribute any substantial amount of heat to raise the temperature of the soil at this time. It is unlikely that the lowering of the temperature of the surface soil compared with the temperature of the air at this time is due mainly to evaporation, as average relative humidities are high during these months.

The meteorological data of Fig. 9 also draw attention to another item of special significance to local farmers. It will be seen that the month of June has the largest average amount of sunshine and the lowest amount of rainfall of any month in the year, and this is the month when the hay crop can be harvested with the greatest possibility of success. This is also the month when the agricultural grasses are in full flower and numerous experiments have shown that this is the stage when they have the greatest amount of nourishment for feeding cattle. The local practice is usually to delay the hay harvest until some time in July, when there is less expectation of sunshine and greater expectation of rain. It is true that there is a slightly greater weight of crop in July than in June, but this is more than compensated by the greater nutritive value of June-harvested hay.

RAINFALL.

Most visitors to Huddersfield seem to be impressed with what they suppose to be its rainy climate, but there is in reality a well-marked rain shadow or difference in rainfall across the whole area (Fig. 10). The dominant wind is from the south-west, and as it rises to pass over the Pennine Chain its capacity for holding water vapour is lowered, often beyond the point of saturation. The rainfall is therefore greatest on the higher parts, an average of over 55 in. of rainfall per annum falling in the Black Hill region. Winds, saturated at the summit, blowing down the eastern slopes become warmer. Their capacity for holding water vapour is thereby increased, and as one approaches the north-east the district becomes progressively drier, and the country round Mirfield and Dewsbury has, on an average, less than 30 in. of rainfall per annum. The change from the wettest to the driest parts of the district takes place in about 10 miles, and involves a difference of more than 30 in. of annual rainfall. This large difference

has an important influence upon soil conditions, especially on the sandy soils, for the leaching of soluble matter from the soil is much greater where the rainfall is heavier. Thus while natural soils to the east of Huddersfield tend to be slightly acid, neutral, or slightly alkaline, those to the west can be moderately or very acid. There is also a greater tendency to 'Pan' formation in the wetter than in the drier parts, as mentioned in the next section.

DRAINAGE.

The differences in soil brought about by the terraced nature of the Huddersfield valleys bring about differences in drainage. The masses of sandstone are the permeable layers, for the water can penetrate readily through the cracks and joints which are such a feature of this formation. The shales are the impermeable layers. The sandy soil upon a flat terrace has usually little water-retaining power, and as it lies over a very permeable subsoil the drainage is extremely good—almost too good, for such land is apt to suffer from drought in a dry summer. The sandy soil creeping over a shaly subsoil as at B in Fig. 4, has a somewhat more retentive subsoil, and such soils tend to have better water relations during summer drought. The actual

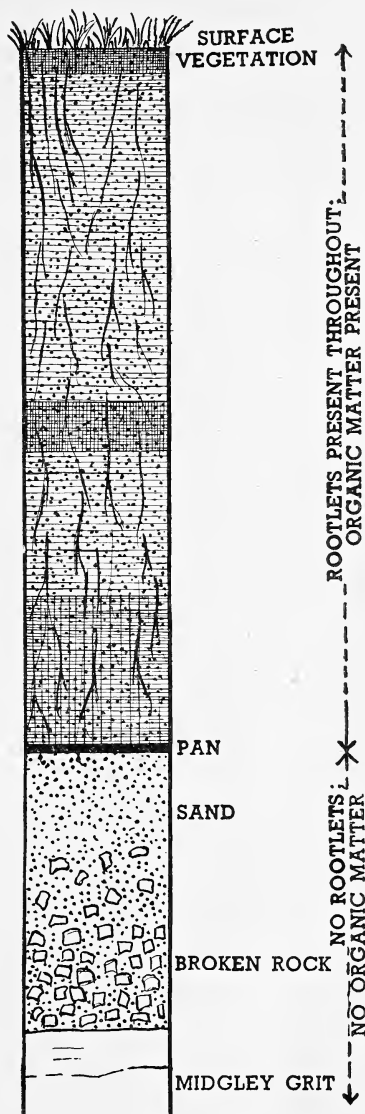


Figure 11

Section of soil and subsoil overlying Midgley Grit showing details of 'pan.'

junction is, of course, the best of all from a water holding capacity and when actual springs do not disturb horticultural operations, probably provides the best conditions in this respect. Heavy soil overlying shaly subsoil, as at C in Fig. 4, is retentive of soil water, and heavy soil overlying sandy subsoil, as at D in Fig. 4, is somewhat less so. The alluvial soils of the flat valley bottoms are retentive of soil moisture and drainage is usually adequate. Soils derived from the ancient bed of the glacial lake are retentive of soil moisture and are not usually poorly drained, except immediately after the heaviest rainfall.

Poor soils containing iron in areas of abundant rainfall are often subject to a peculiar disability of drainage known as 'Pan.' This is a very appropriate name, for the iron is deposited in the form of a thin rusty layer below the surface soil which contains organic matter. Iron is held in colloidal solution in the soil water as long as organic matter is present, but the downwardly directed drainage brings it to the lower layers which have no organic matter, and there it is precipitated in the soil, to form, as it were, the bottom of a pan (Fig. 11). Such a formation interferes with subsequent drainage, and limits the area of root action in the soil. It is possible that the peat formation resulted in some degree from such an interference in drainage. Typical 'pans' can be seen on the summit of March Hill, Marsden, under peat, in a quarry on the Brown Cow Road, near Krumlin, Scammonden, and on Castle Hill, Almondbury. There is no peat above the two last-mentioned sites. The pan on Castle Hill occurs on Elland Flags Shale (Coal Measures) ; the other two are on Millstone Grit sandstones.

LOSSES FROM THE SOIL BY DRAINAGE.

It would be expected that the substances taken from the soil during drainage would be found in the streams which carry away the drainage water, and this is generally true. The stream at Drop Clough, Marsden, has been analysed in some detail by the author. A great difference has been found between the amounts of iron in the upper parts of the stream and the lower parts. The stream at Drop Clough arises on a peat moor and flows for some distance through this material. It makes a spectacular waterfall over the Huddersfield White Rock band of sandstone and then cuts a deep clough with steep sides through two beds of shale and another bed of sandstone. Its relative softness and clearness show that it does not normally carry a large amount of material in solution, and the materials which it carries do not appear to be those which are of extreme importance to the land fertility. Determinations in the streams feeding the Meltham Mills reservoir

show similar conditions with the exception that no iron is present, and nitrates are sometimes found in the spring and late autumn. Losses of nitrates are of direct and vital importance to the cultivator, for they represent a removal of nitrogen in a form in which it can be taken up by the plant. The work of Garner, Brown, and Lovett (2) on the River Holme shows that nitrates are present throughout the year, but reach maxima in May and November. The fluctuations shown in Fig. 12 are typical of those already found in other parts of the country. It is possible that the summer minimum results from the

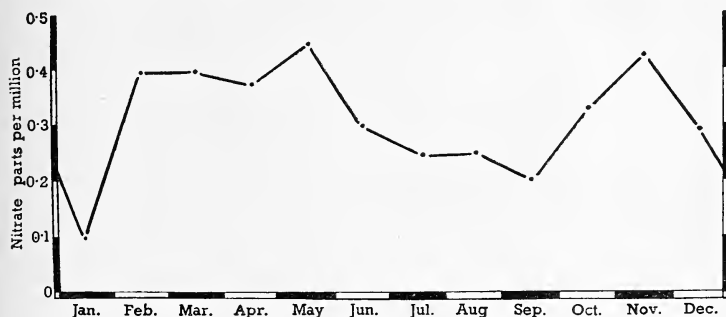


Figure 12

Monthly variations in nitrate content of the upper, unpolluted part of the River Holme. Compiled from data published by Garner, Brown and Lovett.

absorption of nitrate by the growing crops. This loss of nitrogen by drainage cannot yet be controlled in practice, but the gardener or farmer should consider the possibility of growing autumn and spring catch crops to utilise the nitrogen in an economic manner.

LIFE IN THE SOIL

Soil provides a suitable home for a large number of living things other than the green plants which grow upon it. Some of these, such as earthworms, ground beetles, and wireworms, are very obvious to the cultivator. There are, however, other and more minute forms, and the varied types of life in the soil may be summarised as follows :

Primitive living Organisms

Virus.
Bacteria.

Plant life

Fungi.
Algæ.
The seeds of higher
plants.

Animal life

Protozoa.
Worms.
Insects.
Occasionally some of the
larger animals such as
moles, rabbits, etc.

VIRUS.

These ultramicroscopic forms of life are not found as normal inhabitants of the soil, but may occur if the roots or leaves of infected plants are allowed to rot in the ground. This is particularly the case with compost used for growing tomatoes, and one or two occurrences of tomato mosaic have been traced to survival of the virus from previous composts. There is no evidence that any of the numerous virus diseases of potatoes, bean mosaic, or raspberry mosaic, persist in the soil of the district.

BACTERIA.

Bacteria are the smallest forms of life visible under the higher powers of the microscope. They occur in very large numbers in soil, as Table 15 shows.

TABLE 15.—NUMBERS OF BACTERIA AND FUNGI IN VARIOUS TYPES OF SOIL.

Locality	Type of Soil	Husbandry	pH	Organic matter. % of dry weight	No. of bacteria per gram of dry soil	No. of fungi per gram of dry soil
Long Lane, Dalton. Surface 6 in.—9 in.	Glacial.	Grassland.	5.8 6.8	17.5 13.7	46,000,000 40,000,000	100,000 100,000
Swinney Knowle, Honley.	Millstone Grit sandstone.	Grassland	5.8	5.7	3,900,000	600,000
Wilshaw, Meltham.	Do.	Do.	6.5	9.4	3,000,000	200,000
Acre Street, Lindley.	Coal Measures sandstone.	Cultivated	7.4		41,000,000	500,000
Rumbold Rd., Marsh.	Do.	Do.	5.7	9.9	25,000,000	100,000
Do.	Do.	Do.	5.2	12.9	10,500,000	100,000
Catchwater, Marsden Rd. Meltham.	<i>Molinia</i> peat.	Rough Grassland.	4.8	89.9	2,000,000	100,000

Large as are the numbers shown, they only represent a portion of the total numbers, namely, those which will grow upon the particular nutrient material employed. The table does not indicate the kind of bacteria, but apart from the comprehensive chemical review provided by the 'Redox' test mentioned earlier, there is no evidence that the bacteria mainly responsible for fertility are absent from Huddersfield soils. Breakdown of protein to ammonia and nitrates is only curtailed in the specialised conditions of peaty soils or turf

mat, and apart from closely restricted pockets, it proceeds normally in practically all soils available for cultivation.

The specialised bacteria (*Pseudomonas radicicola*) of the root nodules of peas, beans, and other leguminous plants are sometimes absent from the soil. These welcome parasites enable the host plant to make use of the nitrogen of the air. There are several strains of this organism, each of which attacks a particular group of legumes.

The strain necessary for the kidney bean is the most noticeable absentee, and many crops of this plant fail because the obliging parasite is absent. Patchy crops of clover and vetches are probably caused by the unequal distribution of the appropriate strain of *P. radicicola*. Attempts to remedy the defect by adding soil known to support good growth of the crops have not been completely successful, probably because the specific bacterial flora is disturbed. It is now possible, however, to inoculate seed with a suitable strain of the organism.

FUNGI.

Fungi are perhaps most familiar as mushrooms, toadstools, and moulds, but many other forms are known. They probably exist in the soil chiefly as spores—minute reproductive bodies—but numerous kinds are active there, and play their part in the breakdown of organic nitrogen to ammonia. Total numbers of fungi are much lower than those of bacteria, approximate numbers being compared in Table 15. Common moulds whose spores are carried in the air appear to form a considerable proportion of the fungus flora of the soil, but the fungi of greatest significance to the gardener or farmer are those which cause plant diseases :

Actinomyces scabies, the cause of Common Scab disease of potatoes (Fig. 13).

This fungus is present on all soils in the district ; it is very unlikely that it is absent from any square yard of ground. There is strong presumptive evidence that a sister-species, *A. præcox*, is just as widely distributed. It has been shown (3) that the control of Common Scab by the addition of organic matter involves the antagonism of *A. scabies* and *A. præcox*. The former attacks the potato, whilst the latter feeds upon decayed organic matter, and when the numbers of one kind are high those of the other are low. Addition of organic matter increases the numbers of *A. præcox* and diminishes those of *A. scabies*, thus controlling the disease. The addition of lime to the soil favours the disease.

(To be continued)

SPRING RECORDS FROM SWILLINGTON

A. C. SMITH and A. G. PARSONS send the following, all under date of May 17th 1942.

BLACK TERN.—A bird seen hawking over the large water, and subsequently over a flooded field, had a black head and breast, and black underparts whereon a sharp line separated the area of black from the white around the vent and under tail coverts. When the bird had settled on a stone, the bill and legs also appeared dark. The upper parts were of the typical dark slate-grey. (The difference between the sexes in breeding plumage is not quite satisfactorily shown by *The Handbook* illustration. In the several proved pairs I have examined in detail at close quarters, throats and breasts of females have never been fully black. This bird was therefore probably a male. The species crosses Yorkshire regularly on the spring migration (but is seen more frequently in autumn); and it is good that the failure to make a record in spring of 1941 should have been remedied in 1942.—R. C.

BLACK-TAILED GODWIT.—Two birds disturbed from wet mud were clearly of this species, showing in flight light wing-bars, and white rumps with black-tipped tails, beyond which the legs projected. On the ground, size, length of legs and bills, and coloration confirmed the already-formed opinion. (The species has rarely been recorded inland in spring in Yorkshire for many years past. A pair nested in Lincolnshire in 1940 and 1941.—R.C.)

TURNSTONE.—A bird in full summer plumage consorted with a party of Ringed Plovers and Dunlins at the same place and date.

A SCHEME FOR THE ECOLOGICAL SURVEY OF HEATHER MOOR

A FURTHER representative meeting of the Committee of Suggestions for Research of the Yorkshire Naturalists' Union was held in the Botany Department of the University of Leeds on Saturday, March 21st, Professor J. H. Priestley, D.S.O., being in the chair. The object of the meeting was to draw up a plan for ecological work by members of the Union during the coming year. The agreed scheme was based on the assumption that groups of members, or affiliated societies, would collaborate by investigating similar areas in different parts of the county. It was decided that a detailed survey of *heather moor* should be started this year, and, in order to make the results comparable, that the investigation should follow as closely as possible the following scheme :

1. The type of vegetation should be taken as the descriptive character. Heather should cover the ground, and areas with other species abundant should be left out. The heather should not have been burnt within the last three years, a longer interval after burning being desirable.

2. Data are required as to altitude, aspect, slope, rainfall and temperature. For the two latter, average and seasonal data and also variation of soil temperatures (at 10 cm.) would be most valuable.

3. Soil data :

- (a) Underlying rocks and drift (if present).

- (b) Description of layering in soil to a depth of 3 ft. ; also depths of peat and other layers, presence or absence of *pan*.

- (c) Rooting depths of plants, any zonation of animals.

- (d) Soil samples for determination of soil acidity, etc., may be sent to Prof. W. H. Pearsall. (A small *unbroken* block about $3 \times 2 \times 2$ in. pressed firmly into a tin will suffice for a sample from each layer.)

4. Each group of workers should work on a known and limited area with

definite sample plots, in order to permit comparison with other localities. The following are agreed units :

- Plants : 20 plots, each 1 sq. m. *Soil fauna* : 10 plots, each 1 sq. dm.
 Winged insects, snails and small vertebrates : 5 plots, each 400 sq. m.
 Birds : Each plot 1000 × 1000 ms.

It is desirable that the *total number* of organisms in the plot should be estimated.

5. For most organisms periodic sampling will be required. The weather conditions at and before each sampling being recorded. Data as to variations in numbers, times of reproduction and other periodic features will be very valuable, as well as information about food habits and the habitats of immature stages. Larval stages require identification if possible.

6. Referees for identification and advice are :

- | | |
|--|------------------------------------|
| Geology : Dr. H. C. Versey. | Soils : Prof. W. H. Pearsall. |
| Flowering Plants : Dr. W. A. Sledge. | Bryophytes : Mr. F. E. Milsom. |
| Fungi : Mr. W. G. Bramley. | Algæ : Miss L. I. Scott. |
| Lichens : Mr. C. A. Cheetham. | Conchology : Mrs. E. M. Moorhouse. |
| Insects and Soil Fauna : Mr. W. D. Hincks. | |
| Vertebrates : Mr. Wilfred Taylor. | |

In order to give members a chance of discussing the methods and seeing them in operation, it is hoped to make a preliminary investigation of a suitable area during the Whitsuntide meeting of the Union at Horton-in-Ribblesdale. It is also proposed to hold a further meeting in October to discuss any results of this summer's work.

CORRESPONDENCE

The Editors, *The Naturalist*,
 University of Leeds.

Dear Sir,

THE WOOD PIGEON NEST CENSUS.

A national survey of the breeding habitat of the wood pigeon has been organised for this spring and summer. The object of the survey is to find out which parts of the country are most heavily infested with this over-abundant pest, to determine its exact breeding preferences and the density of nests in each habitat, and to confirm the peak period of breeding. Those taking part will fill in a special card for each occupied nest found, and wherever possible the nest will be revisited in order to obtain hatching and fledging data. Census work can be undertaken by individuals working alone, but it also offers exceptional opportunities for team work, *e.g.* by Natural History Societies. A leaflet, 'How to Organise a Wood Pigeon Nest Census', is available, and should be read by anyone intending to encourage team work.

It is also hoped that experienced naturalists will do all they can to organise team censuses, so that representative data will be sent in from each county.

Particulars will be sent to Members of the British Trust for Ornithology and to those who have already written concerning the wood pigeon investigation. Others should apply to this Institute, marking their correspondence Wood Pigeon Investigation.

Yours truly,

M. K. COLQUHOUN.

In Memoriam

J. W. HAIGH JOHNSON.

J. W. HAIGH JOHNSON, whose death on April 19th, 1942, we deplore, gave to the Union that intangible quality of background against which the facts of botanical science might be tested by those of us who have, as yet, less wide knowledge. His constraining modesty somewhat clothed his wealth of information, and his strength lay in the informal conversations which are such a valued part of Union excursions. Criticism, tempered with geniality, or reinforcement of an idea from several angles, could then be obtained in abundant measure, and often with humour. Members of the Mycological Committee probably knew him best, and he has twice been Chairman of that hard-working body. What better consolation can we offer to his family than that his great worth was known and valued in the circles where it could be most appreciated and do most good?—J.G.

REVIEWS AND BOOK NOTICES

Cuckoo Problems, by E. C. Stuart Baker, pp. xvi + 207, with eight coloured and four monochrome plates; Witherby, 25/-. The author has studied cuckoos during practically the whole of his long life. He has had exceptional opportunities for pursuing his researches, and has been able to invoke much valuable assistance from ornithologists all over the world. The result is a masterly exposition of the known facts about the cuckoos, and this is followed by the author's conclusions. These latter alone number 24, and are well substantiated in the text. Among points about which there is still some doubt the author mentions the possibility that some parasitic cuckoos may keep in some sort of touch with their eggs and young, that it is still to be proved that coloration and character of eggs are inherited from mother to daughter, and that there must be some as yet undiscovered way by which certain cuckoos place their eggs in nests which cannot be dealt with by the observed methods of projection or direct laying. War-time restrictions on space prevent us from doing justice to this fine piece of work for which both the author and publisher are to be congratulated.

A Hand List of the Birds of the Sevenoaks or Western District of Kent, by James M. Harrison, pp. xviii + 165, illustrated with 41 coloured plates from original water colours by the author, a number of plates in half-tone and line, and a map of the district. Witherby, 30/-. This handsome volume comes as a great surprise in the third year of a world war. The paper is of the best, and the plates are to match. Dr. Harrison has given much more than a list of Kent birds, with their distribution. The book is a reliable handbook of ornithology, and should prove valuable to those who want to study the birds of the county without having recourse to the more advanced textbooks. The actual figures of the birds in colour are good, but the landscapes with which they are associated are often rather unreal.

The Entomologist for February contains 'Dr. H. Eltringham, F.R.S.', by N. D. Riley; 'Lepidoptera Notes, 1941,' by C. G. H. de Worms; 'Records of the occurrence of a few rare or interesting insects in Scotland,' by D. K. McE. Kevan; 'The Bright Collection Sale (second portion),' by W. R. S.; 'A Natural Population of *Coccinella septempunctata* in Norfolk,' by M. K. Colquhoun; 'Notes on some gall causing Cecidomyidæ III,' by M. Niblett and several notes and observations.

The Entomologist's Monthly Magazine for March contains 'Communal Farming in the New Forest' (Editorial); 'Further Records of the Aquatic Coleoptera of Hertfordshire,' by R. R. U. Kaufmann; 'An Improved Breeding Cage,' by G. S. Kloet; 'Improvements to Burke's Trap for Wood Boring Insects,' by G. S. Kloet; 'The Hymenoptera Aculeata in the Dale Collection—I, Introduction and Notes on the families Mutillidæ to Pompilidæ,' by G. M. Spooner and several shorter notes.

05.42

The NATURALIST

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PRINCIPALLY FOR THE NORTH OF ENGLAND

Edited by

H. H. PEARSALL, D.Sc., F.L.S., F.R.S., and W. R. GRIST, B.Sc.,
The University, Leeds.

with the assistance as referees in special departments of

J. M. Brown, B.Sc., F.R.E.S.

W. H. Burrell, F.L.S.

Chris A. Cheetham, F.R.E.S.

Ralph Chislett, F.R.P.S., M.B.O.U.

W. J. Fordham, M.R.C.S., L.R.C.P., D.P.H.

Mrs. A. Hazelwood.

Mrs. Elsie M. Morehouse.

Thos. Sheppard, M.Sc., A.L.S.

W. A. Sledge, Ph.D.

H. C. Versey, D.Sc., F.G.S.

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The future of 'The Naturalist'

It is intended that in 1943 this Journal will become a regular quarterly, published in January, April, July, and October. This change will hold good until further notice. The number of pages has been increased to 32 and in order to minimise as far as possible the difficulties which the restrictions in the use of paper are causing, smaller type and increased type areas are now being utilized.

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- 'The Naturalist,' May, 1866-67
- 'The Yorkshire Naturalists' Recorder,' 1872-73
- 'The Naturalist,' June, 1940, and January to May, 1941.

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SOILS OF THE HUDDERSFIELD DISTRICT

(Continued from page 141)

FUNGI—continued

Actinomyces species, causing Raised Scab of potatoes.

A particular form of raised scab has been recorded twice in the district during the past eight years (1933-1941).

Spongospora scabies, causing Corky Scab of potatoes.

This disease is distinguished from common scab by the fact that when scratched with the finger-nail, the lesions set free a brown powder, the spores of the fungus, and when washed, leave a honey-combed depression. The disease appears occasionally in the district, on all types of cultivated soil. It may be introduced by inferior grades of seed potatoes.

Synchytrium endobioticum, causing Wart disease of potatoes (Fig. 13).

This very destructive disease has been reported from all parts of the district, and from all soil types under cultivation. It is not as yet very widespread, but its increase in 1941 is serious. Any occurrence of this disease must be reported to the Ministry of Agriculture, and farmers or gardeners upon whose land the malady occurs are required by law to plant only those varieties of potatoes which are immune to the disease. Those most suitable for this district are :

Early varieties : Arran Pilot, Di Vernon.

Second early varieties : Arran Comrade, Great Scott.

Early main crop varieties : Arran Banner, Gladstone.

Late main crop varieties : Kerr's Pink, Majestic.

This list includes such good varieties that, having regard to the increasing spread of Wart Disease in the district, it is strongly recommended that only these immune varieties be planted.

Plasmodiophora brassicae, causing Finger and Toe or Club-root disease of all members of the cabbage family (Fig. 13).

Cabbages, Brussels sprouts, cauliflowers, curly greens, swedes, turnips, stocks, wallflowers, charlock and wild mustard are all attacked by the fungus which is very widespread upon allotments in the district. All types of cultivated soil in the district are subject to its depredations. It is probably introduced upon the roots of young cabbage plants, and is often of somewhat erratic occurrence in a group of allotments, some plots having the disease and others being free of it. The somewhat communal instincts of allotment holders favour its spread upon borrowed tools, the boots of visiting friends and gifts of young plants. It cannot be controlled by the addition of even large dressings of lime on our Huddersfield soils, though, as stated earlier in this handbook, lime makes soil conditions worst for the disease and best for the crop. A certain degree of control can be obtained by treating the roots

of seedling plants with a solution of mercuric chloride (corrosive sublimate), 1 oz. in 12 galls. of water. The plants

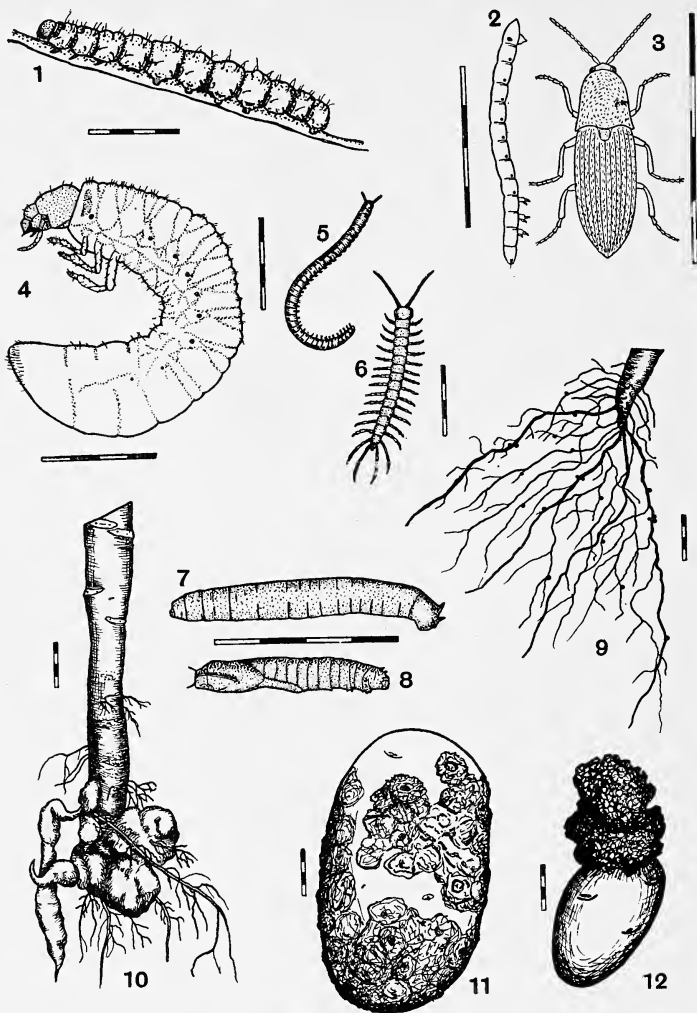


Figure 13

Soil pests and diseases. 1. Caterpillar of the Ghost Swift Moth. 2. Wireworm of the species *Agriotes obscurus*. 3. Adult Click Beetle of the same species. 4. Larva of the Cockchafer. The larva of the Dor beetle is very similar but the third pair of legs is rudimentary. 5. A Millipede, *Blanjulus* species. 6. A Centipede, *Lithobius* species. 7. A Leather jacket, larval form of the Daddy Long Legs, *Tipula* species; and 8. its pupa. 9. Part of the root system of the potato, with Eelworm cysts (the little black dots). 10. Finger-and-toe disease upon the root of cabbage. 11. Common Scab of potatoes. 12. Wart disease of potatoes. The overall length of line beside each diagram represents $\frac{1}{2}$ in. on the original scale.

should be placed with their roots dipping into the solution for half-an-hour, and when planted should have half-a-pint of the liquid poured into the planting hole round their roots.

ALGÆ.

The algæ correspond in structure with the fungi, but have the important additional provision of chlorophyll or green colouring matter. This substance confers the ability to combine the constituents of air and water to form starchy or sugar-like food, using the energy of light. Having such an urgent need for light, algæ are usually active only at the surface. Most cultivators are familiar with a fine green covering of the soil which appears under certain conditions. This is usually an extremely fine web of algæ, and often demonstrates a relatively large balance of nitrogen in the ground. It can be dispersed by cultivation, and corrected by proportionate reduction of nitrogen manures.

WEED SEEDS.

Grassland which has been laid down from previous cultivation very often contains the seeds of weed plants. A field in Long Lane, Dalton, broken up for allotments in 1940, very quickly gave rise to a covering of natural vegetation of fumitory (*Fumaria officinalis*), charlock (*Brassica sinapis*), wild field cabbage (*B. campestris*), and spurge (*Euphorbia peplus*). There can be no doubt that these seeds were lying dormant in the soil; the plants do not grow wild in the immediate neighbourhood, except when the ground is cultivated. Their seeds are not wind borne and it would be practically impossible for them to have been transferred from the nearest patch of cultivated ground. They are purely weeds of cultivation, and the seeds must have lain dormant in the soil for at least twelve years. One interesting feature about these weeds is the rapidity with which they flower. The first three species mentioned above were all bearing functional flowers 39 days after the ground was dug.

Mr. W. E. L. Wattam has recorded (5) similar observations for spurrey (*Spergula arvensis*), knotweed (*Polygonum aviculare* var. *brevifolium*), spotted persicaria (*P. persicaria*), hemp nettle (*Galeopsis tetrahit* and its near relative, *G. speciosa*) and chickweed (*Stellaria media*), in addition to those mentioned above.

PROTOZOA.

These are the smallest and most primitive members of the animal kingdom. They feed upon bacteria and other minute forms of life. It was earlier supposed that they imposed a considerable check on soil fertility, as they devoured the beneficial nitrifying bacteria in addition to other forms. Modern research into the practice of partial sterilisation of soil tends to account for the resulting increase in fertility on grounds other than the destruction of protozoa. There is no evidence, moreover, that the effect of these minute organisms

is at all considerable, and though species of *Amæba* are widely distributed in Huddersfield soils, their presence need not trouble the cultivator.

EELWORMS.

Eelworms are very minute animals, visible under a microscope, which nevertheless cause very considerable damage. Their main effect is upon the potato crop in the Huddersfield district, and several cases of 'Potato sickness' have been recognised. The foliage becomes yellow or brown, the leaves drop from the stem, and infected plants frequently die. Roots have minute, globular, white or yellow 'cysts' about a thirty-second of an inch across, which contain eggs of the eelworm. These become detached from the roots and remain alive in the soil for many years, thus providing a menace for future potato crops. Eelworm is a pest which is better avoided, for control is difficult. It is transferred from plot to plot upon the soil sticking to boots or tools, and every effort should be made to prevent any spread from an infected plot, which should not, moreover, be used to grow potatoes for at least ten years. Applications of crude naphthalene in the autumn, at the rate of 2 oz. per sq. yd., help to reduce the numbers of eelworm, but do not provide a certain cure.

EARTHWORMS.

These common inhabitants of the ground favour most soil types of the district, except the peat and extreme forms of sandstone. They are of great value in mixing the organic matter in soil, and except on lawns, are of great benefit to the cultivator. The estimated average number per acre of 70,000 by Charles Darwin is certainly a conservative number so far as the Huddersfield district is concerned.

MILLIPEDES AND CENTIPEDES.

These are two common types of soil animals. The millipede is a pest and often causes damage on potato. It is usually somewhat sluggish in the soil and often coils itself up into a circular form something like a watch spring. Centipedes usually have much quicker motion, are often much lighter in colour, have a flatter body, and are beneficial. If any doubt is felt the two kinds can be distinguished by the fact that the centipede has one pair of legs on each segment of the body, where the millipede has two. Control is difficult, but on an allotment scale, a heavy infestation can often be prevented by hand picking the millipedes when digging. They may also be trapped with pieces of waste turnip or unusable potato. Such traps must be examined frequently and the millipedes destroyed.

SLUGS AND SNAILS.

Snails do not appear to any appreciable extent on Huddersfield soils, but slugs are often very considerable pests. The black field slug and the small gray slug are the most troublesome kinds, and the most successful treatment is to use a poisonous bait consisting of one tablet of Meta (solid methylated spirits) thoroughly mixed with 1 qt. of sawdust. Small heaps of this should be placed on the surface during wet weather.

INSECTS.

A wide variety of insect life is present in most soils except the peat, and here again both beneficial and harmful species are found. Beneficial kinds are usually capable of relatively fast movement, and pests have a much more sluggish motion. Some of the commoner soil pests which can be controlled very considerably by hand destruction when digging the allotment are :

Leather Jackets, *Tipula paludosa*, are of somewhat sporadic occurrence in the district and as in other areas they attack principally the turf or grassland. The smaller species, *Tipula plumbea*, is often found in considerable quantities on peat lands.

Ghost Swift Moth caterpillars are fairly common pests of grassland, where they eat the roots of grasses. They appear to be able to transfer their attentions to allotment crops for a time after the plot has been freshly cultivated from turf.

Cockchafers, which are a very serious pest in other parts of the country and on the Continent, have been reported on two occasions from the Huddersfield district. The grubs feed in the soil and are about an inch long, usually being somewhat V-shaped, with the hinder part of the body swollen. The closely-related but harmless *Dor beetle* grub has been found very frequently in the district.

Wireworms. These pests, which are the larvæ of several kinds of Click Beetles, may be found on all soils except peat, but Table 16 shows that they are somewhat rare on Millstone Grit sandstone soils, whether cultivated or under grass. This is also reflected in the freedom from damage of potato crops grown on such soils. There is possibly another factor, in that birds, and particularly rooks, are able to scratch out and devour the pests from the light sandy soil when cultivated ; heavier soil presents a greater impediment.

The large numbers given in Table 16 are, however, small compared with those published for other parts of the country. A large population of wireworms does not necessarily mean heavy damage to the crop (4) ; the pests may be feeding upon other material.

TABLE 16.—NUMBERS OF WIREWORMS ON DIFFERENT SOIL TYPES.

<i>Locality</i>	<i>Type of Soil</i>	<i>Husbandry</i>	<i>No. per 200 sq. yards</i>	<i>Calculated No. per acre</i>
Long Lane, Dalton	Glacial.	Cultivated.	4,500	108,000
Highfields, Marsh.	Coal Measure sandstone.	Do.	5,000	120,000
Fernside Av., Almondbury.	Do.	Do.	4,000	96,000
Swinney Knowle, Honley Moor.	Millstone Grit sandstone.	Grassland.	150	3,600
Wilshaw, Meltham.	Do.	Do.	150	3,600
Honley Moor.	Do.	Cultivated.	200	4,800
Station Road, Honley.	Alluvial.	Do.	7,200*	172,800

TYPES OF FARMING

Agricultural activities of the district are centred mainly round grassland husbandry designed for milk production. Hay is the principal harvested crop, and in normal times this is heavily supplemented by purchases of concentrated foods. Many farms introduce a small amount of arable land, usually upon the rotation :

Grass ley

Oats

Root crops (potatoes or swedes).

Corn crops (usually oats as a nurse crop for grass seeds mixture).

Seeds.

On the sandier soils potatoes are commonly grown in the first year from grass, but on the heavier soils they are subject to the attack of wireworms. This pest also attacks the oat crop.

This practice of lea farming is particularly suitable for the needs of the district and has the important effect of conserving the organic matter. This accumulates while the land is down to grass and is utilised when the ground is ploughed for the crops.

The extension of arable cropping during the war will have the effect of using the reserves of organic matter, and it is important that steps be taken to maintain the humus at a sufficient level for crop fertility. This can best be done by taking catch crops of green material, *e.g.* mustard or rape, after the main crop is harvested. Such catch cropping would also have the advantage of conservation of the supplies of nitrogen which, as shown earlier, are lost by drainage during the autumn and early spring when there is no cropping to make use of the soluble nitrate.

The Ministry of Agriculture has, in its policy for extending the arable acreage, recognised the importance of conserving organic matter. No great increase in the area of permanent ploughed land now seems possible, and some of the poorer

* This figure, kindly supplied by Mr. C. Ridgwick, represents a minimum number, as the wireworms were obtained from damaged potatoes, and not collected from the soil, as in other counts.

grassland is to be ploughed for short-term arable cultivation. It will be re-seeded with good quality grass seeds after two or three seasons' crops. This will bring a much needed increase in such crops as potatoes and oats, and will not unduly deplete the ground of organic matter. The quality of the resultant grassland will also be greatly improved.

The quality of all natural grassland, and particularly on Millstone Grit soils, is usually poor from an agricultural point of view. There is a strong tendency to revert to the natural vegetation, namely, *Aira flexuosa*, Wavy Hair Grass on the Sandstone soils, and Creeping Soft Grass, *Holcus mollis*, or Yorkshire Fog, *H. lanatus*, on the heavier soils. *Aira caespitosa*, Tussocks, appears naturally along with rushes, *Juncus conglomeratus*, where the ground is badly drained at the surface. All these species give but little nourishment for farm animals.

Most soils, except the glacial and alluvial types, are too acid for the best growth of the agricultural grasses such as Rough Cocksfoot, *Dactylis glomerata*, and the meadow grasses (*Poa* species). These species thrive well in the district when the ground is well limed, and this practice is perhaps the most direct method of improving grassland in this area.

CROP POSSIBILITIES

The district can be used to grow many more crops than are in cultivation at present ; indeed, with many plants, the limits seem to be imposed by the capping of peat on the hills rather than by any other factor.

Wheat is usually confined to the ground lower than 600 ft. above sea-level, but satisfactory crops have been grown at elevations up to 800 ft.

Oats thrive well up to 1,000 ft. in the district.

Barley is usually confined to the low parts of the district, below 600 ft.

Rye is not grown in the district, but satisfactory crops have been obtained on a Millstone Grit shale soil at Slaithwaite at the height of 800 ft.

Potatoes and swedes yield satisfactory crops on all soils in the district and to a height of 1,000 ft.

Vetches and clover can be grown on all soils up to a height of 1,000 ft., though some soils lack the appropriate strain of root nodule organism, and acid soils must be made less acid by the addition of lime. The most suitable pH is 6.0 to 6.5.

Rhubarb can be grown as a satisfactory crop on all soils in the district, but requires heavy nitrogenous manuring. I have grown it successfully at an altitude of 800 ft. on Millstone Grit shale and sandstone soils.

Apples can be grown up to a height of about 800 ft., but are very much subject to wind damage before they can be harvested at the higher elevations.

Raspberries, loganberries, black currants, and red currants can be grown satisfactorily up to a height of about 800 ft.

A mixed crop of grey field peas and oats is a useful crop for all cultivated soils in the district. It can be grown to maturity and threshed to serve as cattle food or it may be sown as late as June upon light soils and used for silage. It is particularly useful on light soils to remedy the disappointment of an earlier sown crop which has failed. Maximum yield, however, is obtained by somewhat earlier sowing.

Marrow-stem kale is another useful crop particularly on heavy soils. This crop also can be used to repair the loss of an earlier crop, for even if it is sown as late as June it will provide a satisfactory crop for use as cattle food in November and December. Highest yields, however, are obtained by somewhat earlier sowing.

Salsify, scorzonera, and chicory have all been tried on an allotment scale, and while they gave satisfactory growth it is not recommended that they are of sufficient cropping power for satisfactory food production.

Celeriac (turnip-rooted celery) and kohlrabi give satisfactory growth and provide useful crops for the allotment.

Seakale beet is an excellent crop for the provision of green vegetables in the early spring, when most other kinds are scarce. It should be sown in April and yields throughout the summer, autumn, winter, and spring, being hardy to even severe frosts. It should not, however, be used for a second season as it is then very prone to bolt or run to seed.

Spinach beet is similar to seakale beet, but is neither so productive nor so tasty.

Sprouting broccoli and sprouting kale are somewhat susceptible to hard winter frosts, but are quite satisfactory on a hillside site where frost 'pockets' do not occur. Both are well worth growing as they come into production at the time of the year when there is practically no other green vegetable.

Sugar beet will grow satisfactorily on the lower-lying ground.

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SOME CHEMICAL ASPECTS OF THE FUNGI

MARY GRAINGER, M.Sc.

Chairman's Address to the Y.N.U. Mycological Section, September, 1942

My interest in fungi has been directed to some chemical features ; for instance, what is the chemical composition of the plant tissue, why do some toadstools make a good dinner for a slug and others a palatable *hors d'œuvre* for us human beings if they have not already been captured as a breeding ground for flies? With these questions in mind I made a preliminary investigation of some fungi for the chemical substances which are the commonest constituents of other plants. The results are shown in Table I.

TABLE I—QUALITATIVE TESTS UPON SOME COMMON FUNGI

	Cellu- lose	Lignin	Red ^g . Sugar	Starch	Protein		Fat
					Biuret	Xantho- proteic	
<i>Phallus impudicus</i> stalk . .	—	—	+	—	—	—	—
„ „ egg . .	—	—	+	—	—	—	±
<i>Lenzites betulinus</i> . . .	—	—	+	—	+	+	—
<i>Pluteus cervinus</i> cap . .	—	—	+	—	+	—	—
<i>Panus torulosus</i> cap . .	—	—	+	—	+	+	—
<i>Fomes annosus</i> . . .	—	—	+	+	+	—	—
<i>Polyporus squarrosus</i> cap. .	—	—	—	—	—	—	—
„ „ stipe . .	—	—	—	—	—	—	—

THE NATURE OF CELL WALLS IN THE FUNGI

This question has been investigated by several workers, and the general conclusion is that they consist of chitin or sclerotin, a substance usually met in animals rather than in plants. Norman and Peterson (1932) treated the mycelium of *Aspergillus Fischeri* with alkali and obtained a very resistant residue containing hexosamine (glucosamine). This material did not dissolve in cellulose solvents, and when treated with weak acids it yielded glucose and hexosamine. Zechmeister and Toth in 1934 succeeded in identifying the chitin of *Boletus* sp. with the chitin contained in the shell of crayfish by isolating from them the same derivatives. It appears, then, that though the cell walls of the soft tissues of higher plants are mostly composed of cellulose, those of the fungi are chitin, or sclerotin as it is also called. After treatment with alkali, this substance gives a deep violet or deep plum-pink colour with a solution of iodine and dilute sulphuric acid.

The chemical structure of cellulose is known to be one of straight chains of β -glucose residues, the chains being laid down in bundles (Preston, 1939). These bundles correspond to the micelle of Nägeli. Lignification of the cells of higher plants means the deposit of lignin in the spaces between the micelles. Sclerotin, however, consists of chains of acetyl glucosamine (Meyer and Pankow, 1935). Only a few fungi are lignified, and presumably such kinds would have the lignin laid down in the intermicellar spaces of acetyl glucosamine chains.

NITROGEN NUTRITION AND THE SEASONS

It is interesting to note here that a good deal of nitrogen would be required for the amine groups of these sclerotin walls of fungal cells. It is suggested that this large demand for nitrogen, in addition to that necessary for the living protoplasm, may supply the reason why we must wait until autumn for the main crop of fungi. There would appear to be three seasonal factors, any one of which could

limit the growth of fungi : (1) the amount of available nitrogen, (2) temperature, and (3) soil moisture. In autumn there has been time for bacteria to act upon plant and animal products and so produce the nitrogenous material in suitable form ; summer temperatures have helped this action, and then comes the extra moisture of autumn weather to give the complete set of conditions for fungal growth. In spring the nitrate increases to a maximum and there is adequate soil moisture, but the average soil temperature is low. In summer the nitrate and ammonia are both at a minimum, probably due to their removal from the soil by the quick growth of higher plants. Soil moisture is also minimal, though the temperature is higher. Only in autumn, particularly in September, is there adequate available nitrogen, along with sufficient soil moisture and suitable temperature. This is, of course, a very broad generalisation, and species vary in the season of their appearance. The St. George's mushroom, for example, probably appears with the spring maximum of nitrogen when the lower temperature appears to be sufficient for this species.

There are other evidences that nitrogen plays an important part in the nutrition of fungi. In the cultivation of mushrooms, lignin, and protein were found to be the most important constituents of the compost (Waksman and Nissen, 1931). The best yield of fungi was obtained from composts to which 25 per cent. (dry weight) of wheat straw, the necessary amount of nitrogen, and mineral substances had been added (Waksman and Stevens, 1930). Relative acidity of the compost also plays an important part, and my husband found that mushrooms always grow best on a neutral or slightly alkaline medium, both in the field and in successful composts.

There is evidence that fungi can use either the positive ammonium or the negative nitrate radicle for their source of nitrogen. Sakamura (1932) proved this for *Aspergillus Oryzæ*. In 1934 he showed that the amounts of iron and copper in the substrate regulate this in some way. Iron promotes absorption of nitrate from ammonium nitrate, but if both copper and iron are present the ammonium ion is used. It may be that recent application of oxidation-reduction potential to soil problems will be able to explain this further.

USEFUL PRODUCTS OF FUNGI

Many fungi use carbohydrates as a nutrient medium for the production of alcohols. The activity of several yeasts in producing ethyl alcohol, as in beer and wines, is well known, but other alcohols are also produced, such as the polyhydric alcohol mannitol which is formed by *Byssoschlamys fulva* to the extent of 30 per cent. from the sugar consumed (Raistrick and Smith, 1933 and 1935).

Other useful products of fungi include acetone, which is made from maize by fermentation with a bacterium. This manufacture was tremendously expanded in the Great War (1914-18) when the uses of acetone were realised. It is needed for the making of cordite. Another product of the same fermentation is butyl alcohol, which, among other uses, is a plasticiser for paints and varnishes.

Perhaps the most modern research in the fungi is that on Penicillin, the new drug which may supersede M and B 693 when it can be manufactured artificially. Paley and Osicheva (1935) found that the fungus *Penicillium luteo-purpureus* checks growth and citric acid formation in *Aspergillus niger*. They isolated from the nutrient liquid of this *Penicillium* a thermo-stable substance, soluble in ether and chloroform, and called it Penicillin. Presumably this is the substance to which the research institutions are now paying so much attention. They are growing acres of *Penicillium* mould to supply them with small quantities of natural Penicillin. When they have found its chemical structure they may be able to synthesize it artificially. When it is possible to turn it out by the ton the medical world may expect to see Penicillin supersede the much-used drug M and B 693. At the moment of writing (1942) the chemical structure of Penicillin is not completely known. Research workers in the laboratories of America and Germany, as well as of this country, are holding a race to find this piece of knowledge.

PIGMENTS

Many pigments are produced by fungi, as anyone who has seen a display of our findings can testify. These pigments have been studied and isolated ; the chemical

composition of many of them is known, and it has been found possible to synthesize some of them artificially. One is lead to the conclusion that fuel targets and coal rationing will not be necessary to release the coal to supply dyestuffs for future generations—the following list should satisfy the most exacting sartorial artist of the future :

TABLE II—PIGMENTS IN FUNGI

Fungus	Pigment	Colour	Found by	Date
<i>Aspergillus glaucus</i>	Flavoglucin	Lemon yellow	Gould and Raistrick	1934
	Auroglucin	Golden orange	" " "	"
	Ruboglucin	Ruby red	" " "	"
<i>Aspergillus terreus</i> and <i>Penicillium</i> <i>citrinum</i>	Citrinin	Yellow	Raistrick and Smith	1933, 1935
<i>Helminthosporium</i> <i>gramineum</i>	Cynodontin	Bronze	Zimmerman <i>et al</i>	
<i>Penicillium phænium</i> (old cultures)	Phoenicin	Red	Friedheim	1933

The above pigment Phoenicin increases the respiration of *Bacillus pyocyaneus* as much as 200 to 300 per cent. It seems to act as a catalyzer.

Any amateur fungologist knows the characteristic colour change of some species of *Boletus* on breaking the cap and exposing the inner tissues to air. Bertrand, as long ago as 1892-1902 first studied this phenomenon. He isolated Boletol, a red crystalline substance showing the properties of a phenol. More recently Kōgl and Deijs (1934) have isolated Boletol from *Boletus satanus* and *B. luridus*. When exposed to the air, boletol turns into a quinoid compound, the salts of which stain a pale blue. The colour change in these fungi has thus been definitely proved to be an oxidation reaction.

Organic acids are another product of fungal activity. The formation of citric acid by the mould fungi, particularly *Aspergillus niger*, has received special attention because of the commercial value of this acid and of its ability to stimulate the human palate without offending the digestion. Fruit jellies, fruit-flavoured sweets, and chocolate centres probably all now derive their fruit flavour from citric acid produced by moulds. Although this fact that moulds can produce citric acid from glucose has been shown by several workers, they are not by any means agreed as to the scheme of the series of products concerned in its formation. As the production of citric acid has such practical value, it is of importance to find the conditions for maximum yield. Various workers have found that the presence of certain substances such as magnesium nitrate or salts of ammonia, iron, and zinc may increase the yield, but there is considerable diversity of opinion, and it may be that different strains of the fungus react differently, for the strain appears to be of extreme importance in the matter of yield.

The best materials for the fungus to grow on seem to be glucose and sucrose. Maltose, treacle, and molasses are not so good. Molasses can yield a fair amount of citric acid if the strain of *Aspergillus niger* is carefully chosen.

Raistrick and his associates (1933-35) have discovered various other organic acids produced by moulds. *Penicillium Charlesii* has been studied in detail. Other fungi from the mouldy seeds of corn have been isolated, and have given rise to the question as to whether the pellagra disease of human beings who eat this corn may be connected with the substances produced by the fungi. One of the new organic acids isolated from moulds by these workers is closely related to ascorbic acid (Vitamin C).

POISONS PRODUCED BY FUNGI

Many poisonous substances are produced by fungi. Even an edible fungus like *Marasmius oreades* (one of the Ministry of Agriculture's list of edibles) was found by Mirande (1932) to have hydrocyanic acid in the lamellæ, but not in the mycelium or spores. The fruit bodies liberated hydrocyanic acid on extracting with cold water, but to a greater degree when boiled. This poison was also found in *Clitocybe geotropa*.

Delezenne established the fact that zinc is an element characteristic of snake poison, and Mousseron and Faroux in 1932 made an investigation of some edible and some poisonous fungi to see whether there was any correlation between the amount of zinc present and the hæmolytic and nucleolytic properties.

TABLE III—ZINC CONTENT AND POISONOUS NATURE OF FUNGI

		Zinc content mg. per Kg. dry subs.	Hæmolytic activity	Nucleolytic activity
Edible	{ <i>Boletus edulis</i> . . .	74	—	0.93
	{ <i>Lactarius deliciosus</i> . .	86	—	0.40
	{ <i>Claviceps purpurea</i> . .	90	—	—
	{ <i>Hygrophorus conicus</i> . .	136.6	—	0.40
			(agglutination)	
Poisonous	{ <i>Amanita muscaria</i> . . .	167	+	3.13
	{ <i>Amanita pantherina</i> . .	202	+	1.76
	{ <i>Russula emetica</i> . . .	211	+	1.80

We can conclude that the toxic properties as shown by the power to attack red blood corpuscles (hæmolytic), or cell nuclei (nucleolytic), are parallel with a high zinc content. The exception is *Hygrophorus conicus*, but in this case there was an agglutination, which means that the corpuscles, instead of being destroyed, adhered together or were precipitated.

Claviceps purpurea is the disease of rye from which the drug ergot is obtained. The alkaloid ergobasine, discovered by Moir in 1932, is the substance in ergot which has medicinal value. Ergot is not too poisonous to be taken internally, and it is interesting that the zinc content of *C. purpurea* is nearer the range of the edible fungi than of the poisonous ones.

Penicillium brevicaulis was found by Challenger and Higginbottom (1935) to produce a volatile aromatic substance containing arsenic, namely trimethylarsine.

There is still another interesting aspect of fungal poisons, namely, their action as antigens. These are substances which, when introduced into the body of an animal, stimulate that animal to make other substances, known as anti-bodies, which negate the harmful influence of the antigens. Ford (1906-7) found that extracts of *Amanita phalloides* ('The Death Cap') acted as antigens when inoculated into rabbits, thus giving them immunity to a similar extract if subsequently reinoculated. 1 cc. of serum from such rabbits would neutralise five to eight times the dose lethal for guinea pigs, and is so potent that it can be diluted 1 in 1,000 without losing its immunising (anti-hæmolytic) effect. Antigens seem to be large colloidal molecules. Nearly all soluble proteins are antigens, and most antigenic substances are proteins. It has, indeed, been doubted whether anything except protein molecules can serve as antigens. Abel and Ford (1907), however, found that the poison from *A. phalloides* was an antigenic glucoside, and not a protein, so that it was thought at that time that here in the mycological sphere was a striking exception to the general nature of antigens. Since then other non-protein antigens have been found.

Another non-hæmolytic poison from *Amanita* was found by Ford and named by him *Amanita toxin*, but it was found to contain neither protein nor glucoside, and no anti-toxic serum or definite artificial immunity can be claimed for it.

The eating of fungi is generally associated by the public with a certain amount of risk. Once a year before the war we risked and enjoyed a supper of a wonderful mixture of toadstools, and trusted to the skill and good faith of a few old hands of the Berry Brow Naturalists' Society. Members of this Mycological Committee of the Y.N.U. have also made gastronomic experiments in the past, and *Polyporus giganteus* is indeed to be recommended with bacon. It is reputed of an earlier member that to try suspect species out on the wife was the soundest method.

Dorothy Sayers and Robert Eustace have written a mycological melodrama called 'The Documents in the Case,' with an unfortunate victim, who, though he is a connoisseur of toadstools, is poisoned by eating those of his own gathering. This dead mycologist is supposed to have confused the poisonous *Amanita muscaria*,

or Fly Agaric (so called because it was originally used to make fly papers), with the harmless and edible *A. rubescens*. His skill is really incapable of this mistake, though a faded *muscaria* can, with the casual glance, even of the expert eye, look like a *rubescens*. But this fungologist was an expert, had eaten fungi for years, and had also a cautious, precise character. Such a mistake was unlike him, and suspicion was aroused. Actually the murderer had put synthetic muscarine into the pot to make it appear that the mycologist had accidentally given himself a supper of poisonous *A. muscaria* instead of one of *A. rubescens*. It appears to be an undetectable murder, but a little knowledge is a dangerous thing, as you will see.

Choline is the non-poisonous base, present in such fungi as *Boletus elegans* and *B. luteus*, and from which muscarine can be formed by oxidation with nitric acid. Muscarine is an exceedingly poisonous base present in *A. muscaria*. The murderer in this novel did not know that synthetic muscarine differs from the natural product in its effect in turning the plane of polarisation of polarised light. Natural muscarine is an asymmetric molecule and turns the plane of polarisation to the right (dextro-rotatory), while the synthetic product is optically inactive, being a mixture of dextro and lævo, as are many other synthetic organic substances. The total effect of their separate action upon polarised light is nil, since one deflection to the right (dextro) neutralises the other to the left (lævo). So when the synthetic muscarine was examined with the polariscope no light came through; the blackness revealed the murderer's black heart, and so the mystery was solved.

FOOD VALUES

This funereal note would make an unsuitable conclusion, so here are some positive food values of the fungi. Saburow and Wasiliew (1932) give the following values for protein content:

TABLE IV—PROTEIN CONTENT OF FUNGI

	Protein % of dry wt.
<i>Agaricus campestris</i> . . .	32.06
<i>Boletus edulis</i> . . .	31.25
<i>Tricholoma portentosum</i> . . .	10.50
<i>Collybia velutipes</i> . . .	8.87

Sabalitschka (1931) agrees with the above workers as regards the high protein content of *Agaricus* (= *Psalliota*) *campestris* and *Boletus edulis*. In fact, he considers that in the major nutrients protein, fat, and carbohydrates, fresh mushrooms rank equal with fresh vegetables. These figures also emphasise the importance of nitrogen in the growth of fungi.

A wide variety of carbohydrates is found in the fungi. In my own tests, only *Fomes annosus* contained starch, though all the species examined had reducing sugars. Hida (1935) investigated 22 species of *Aspergillus* and found only nine which formed starch, and even these required a special medium, namely a strongly acid one.

Clutterbuck *et al* (1934) isolated the less well-known polysaccharides, polygalactose, and polymannose from *Penicillium Charlesii*.

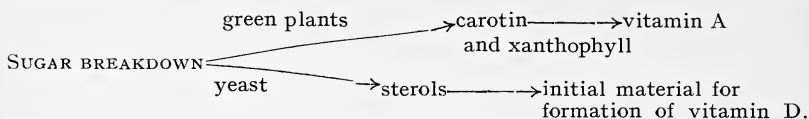
The fat content of fungi varies considerably, *e.g.* *Boletus edulis* contains 1.6 per cent. while *B. scaber* has 9.69 per cent. (Saburow and Wasiliew, 1932). This fatty material consists of various substances, *e.g.* in *Penicillium aurantio-brunneum* (Strong and Peterson, 1934) the lipid content consists of:

85.4% fatty acids.	1.9% ergosterol.
4.5% unsaponifiable matter.	9.1% glycerol.

The fatty acids include palmitic, oleinic, linolic, stearic.

Sterols appear to be formed from sugar by fungi (Euler and Klusmann, 1932) and seem to be important as the initial material for the formation of Vitamin D (Bernhauer and Patzelt, 1935). The following diagram compares the stages of

breakdown of sugar which lead to vitamin formation in green plants and in yeast :



The vitamin D content of several common fungi is given in the table from Scheunert *et al* (1935).

TABLE V—VITAMIN D IN FUNGI

	Rat units per gram.
<i>Boletus edulis</i>	0·83
<i>Cantharellus cibarius</i>	0·83
<i>Helvella esculenta</i>	1·25
<i>Agaricus psalliota</i> in dark	0·21
„ „ under normal conditions	up to 0·63

In conclusion, I would like to direct your attention to the fact that as the fungi convert glucose into such various substances—acids, pigments, and alcohols—by various avenues, there seems to be an unlimited prospect for the obtaining of new organic compounds with the aid of fungi.

It must not be forgotten, however, that the real value of fungi as food is the personal thought 'I do like mushrooms with my bacon,' and one of my happiest recollections of a camping holiday is of my husband meeting me on coming out from the tent into the fresh morning air with such a fragrant dish.

I wish to acknowledge my grateful thanks to my husband for help and suggestions in all stages of the preparation of this paper, and also to Dr. R. D. Preston, of the Botany Department, Leeds University, for advice and guidance to the literature.

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NOTES ON A YORKSHIRE NEST OF LESSER SPOTTED WOODPECKER, JUNE, 1942.

R. M. GARNETT

1. STATUS. This species is generally local throughout Yorkshire and, so far as I know, has not previously been recorded breeding near Pickering, though the late James Green is said to have seen it when Keeper at Kingthorpe (Ref. 'Notes on the Hole of Horcum,' *N.W. Naturalist*, June 1937).

(The photograph labelled as this species in Nelson's *Birds of Yorkshire*, facing p. 276, is well known to be a Great Spotted Woodpecker.)

2. SITE OF NEST. The nest was in a dead ash tree, in a rotten bough about 40 ft. above the ground, in a fairly open part of a hanging wood facing west. The entrance hole faced W.N.W., and was exposed to the afternoon sun. It was in a rookery where the young rooks are shot.

3. FEEDING OF YOUNG. It was on June 4th when the male was seen with food in his bill. His latest capture had been a green caterpillar, and this he was beating on a bough, I think, in order to remove the insides before feeding it to the young. (A young hand-reared Cuckoo squeezed out the insides of cinnabar caterpillars before swallowing the body.) The Woodpecker then flew straight to the nest. On that date both male and female were in attendance, and both were seen to remove excreta. It is not certain whether these were sacs, or wood-dust-covered droppings. From June 7th till the young left the nest (sometime between 12.00 hours on June 18th and 15.20 hours on June 19th) only the male was seen; and it is practically certain that he brought them up alone, as the nest was kept under observation for over ten hours in all, at varying times of the day, until June 19th, during which periods he paid forty-one visits to the nest. A young male was first seen at the entrance hole on June 14th, and a young bird of each sex on June 16th. Assuming that the fledging period is 21 days and that the young left the nest on the 18th/19th, the male took entire charge when they were about a week old. On June 18th, when the young were ready to leave, it seemed that the male was keeping them on short rations, for they were left for periods of 23 minutes and 36 minutes without food during $1\frac{3}{4}$ hours of continuous observation. During the second of these foodless periods one young male was much in evidence at the entrance, poking out his head, looking upwards, and calling for food at frequent intervals. The call was a weak edition of the adult's alarm note 'Whi-hi-hi-hi-hi.'

4. SANITATION. As previously stated, both parents removed excreta when both were in attendance on June 4th, but no record of frequency was made at that time, nor was it certain when the change took place from sacs to wood-dust covered droppings, but it was thought that wood-dust was used from June 7th onwards. After about 36 hours of almost continuous light rain preceding the evening of June 14th, the male was observed to bring up wood-dust matter which was not carried away, but was scattered by head shaking at the entrance to the nest, without emergence, three times at one visit and seven times at the next (five minutes later); and it is believed that this was the bird's method of drying the base of the nest chamber which had probably become soaked through the percolation of rain into the rotten wood. He had previously, during the same period of observation, carried away excreta in his bill. During a period of $1\frac{3}{4}$ hours on the 18th, when six visits were made, he never entered the nest, and perhaps considered it was no longer necessary to keep it clean when the young were ready to leave, or perhaps the short rations being given had lessened the necessity.

5. AFTER VACATION OF THE NEST BY YOUNG. The immediate vicinity of the nest was left shortly after the young had emerged, for they were not seen or heard again. The male, however, entered the nest once on June 19th, after they had gone, carrying food and emerging almost at once still carrying it. This was the last occasion on which he was seen.

TABULATED OBSERVATIONS

June 4	June 7	June 9	June 11	June 14	June 16	June 18	June 19	
About		10.00 }	18.45 }				15.20 }	Periods when nest was under observation.
14.00	16.45 }	10.55 }	19.45 }				17.40 }	
	17.45 }			18.00 }	11.00 }	10.15 }		
		11.50 }	20.10 }	19.00 }	11.25 }	12.00 }	20.15 }	
		12.20 }	20.40 }				21.00 }	
<hr/>								
Both Male and Female feeding young and removing excreta.		10.05						
		10.14*						
		10.22						
		10.42				10.40		
					11.10	11.03		
		11.56*			to	11.04		
		12.00			11.25	11.06		
		12.04			Four times	11.10		
		12.08			Nest not	11.46		
		12.10			cleaned	Nest not	15.34	
		12.16*				cleaned		
		Male			Male	Male	Male	(D.S.T.) Times of visits by male to nest. June 7-19 during which period female was not seen.
		brooded			entered	never	entered with	
		10.22 to			once	entered	food and	
	16.50	10.27			Young male	Young male	emerged	
	to		18.06*		and female	much at	still	
	17.30	10.42	18.10*		came up	entrance	carrying it.	
	seven	to			to be fed.	between		
	times.	10.48	18.17*			visits and		
	Nest		18.22*			calling as	Young had	
	cleaned		18.27*	19.18		neglected.	fledged and	
	three		18.32*	19.44			were not	
	times.		Young				seen or heard	
			male			Male	near nest.	
	Male					now keeping		
	entered		20.14			young hungry?		
	nest		20.24					
	every		20.28					
	time.		20.30*					
			20.36*					
			at entrance.					

(* Denotes that nest was cleaned.)

The foregoing has drawn the following valuable comments by Mr. N. Tracy, who has specialised on the Woodpecker family for many years in Norfolk.

In his interesting notes on a pair of Yorkshire Lesser Spotted Woodpeckers, Mr. R. M. Garnett's observations of abandonment by the female of feeding the young for some time before they leave the nest, fully agree with my own. In May 1936 I watched a nest, in a Devon apple orchard, for four days, putting in many hours at it from daybreak until darkness set in. The young hatched just about the time that I first arrived at the nest, and during the four days I did not once see the female. My friend, a very good ornithologist, who showed me the nest, had watched it from the time when the first chip was removed until the young left the hole 27 days after they were hatched. He told me that the female did not help with the excavation of the hole, with incubation or with feeding the young, it just laid its eggs and then went away and was not seen again until some time after the young had left the nesting hole and had dispersed. In the same year (1936) I found a L. S. W's hole in a birch tree just a week before the young

left the nest. I watched it for many hours, but on no occasion did I see the female. At the end of the week I saw the last young one leave the nesting hole at 6.46 a.m. It was a male, and the other young had evidently left before my arrival as they were calling in the surrounding trees. A few days later I found another L. S. W. nesting hole, this time in an elder about 7 ft. from the ground. Three days later I watched the hole from 4.30 a.m. until 4.15 p.m. The female never once put in an appearance during the time I watched the nest. On the last day the male fed the young thirty times between 4.30 a.m. and 6.1 a.m., when I left for an hour or two. I returned about 8.30 a.m. and between 9.1 and 9.10 a.m. the male fed the young four times. At 9.10 a young male flew out of the hole. After this there was no more feeding during my visit. At 11.45 a.m. a young female left the hole. When I left at 4.15 p.m. there were still two young birds, a male and a female, in the hole.

In 1937 I watched two nests. One hatched on May 28th. On June 10th both birds were feeding. I was unable to visit the nest again until June 16th, when only the male was present. On June 18th the young birds were very noisy. I could not stay very long, but while I was at the hole both birds were absent. I believe the young left the hole the same day.

The young in the second nest hatched out about May 27th. I watched the nest for long periods on the 28th and 29th, and both birds were feeding the young. After this I went away for a week, and upon my return found that the hole had been opened up by a Great Spotted Woodpecker and the young had evidently been killed, and most probably eaten, as there was no sign of life about the hole.

In a nest which I watched in 1938 the female fed for a week and then went away and was not seen again.

In 1939 I watched a nest in a tree which had been used the previous year, a new hole being excavated under the old one. The young hatched out about the 23rd of May, the female was last seen on May 26th. On June 17th the young had left the nesting hole.

In 1940 the same tree was used again, a fresh hole being excavated on the opposite side of the tree. The young hatched out on May 17th. The female was not seen after May 24th. Young left the hole on June 7th. The male fed young four times between 4.33 a.m. and 4.40 a.m. The first young one left at 4.40 a.m. Male fed 6 times between 4.44 and 5.16 a.m. It fed again at 5.20 and immediately afterwards another young one left the nesting hole. It fed 6 more times between 5.25 and 5.36 a.m. The last young one left the hole at 5.50 a.m.

In 1941 the birds excavated another hole in the same tree. Soon after the female had started to lay I visited the nesting hole early one morning and found it had been interfered with. There was a small jagged hole under the entrance hole and a much larger one right into the bottom of the egg chamber. While I was watching it I heard a G.S.W. call from amidst the leaves above the hole. Upon visiting the tree the next morning I found two sucked L.S.W. eggs laying on the ground immediately beneath the nesting hole.

At another L.S.W. hole the young hatched on May 28th; the female was not seen on this date or on any subsequent occasion. I saw three young females leave the nesting hole on June 21st, the solitary male had evidently left before my arrival. Male fed twice between 3.54 and 3.58 a.m. At 3.59 one young one left hole and flew away. At 4.58 a.m. male fed again, at 5.3 a.m. it fed again, and directly afterwards another young one left the hole. The male fed the last young one five times between 5.7 and 5.50 a.m., and directly after this the last young one left the nest.

To sum up, it appears that it is usual for the female to give up feeding the young after the first week, and that sometimes they do not feed the young at all.

Mr. Garnett's observations upon removal of excreta also agree with mine. I do not think that there is any fixed time when the excreta starts to be mixed with sawdust, as I have seen white capsule being removed from the nesting hole about up to the end, although at this time the excreta mixed with sawdust is the rule. I once saw a male L.S.W. bring a hard lump of excreta from the bottom of the nesting hole and, after some hesitation, eat it at the entrance. The old birds do not remove excreta the day before the young leave the nest or the day of their departure, but at this period the young may frequently be heard tapping inside the hole, evidently knocking off sawdust to mix with the excreta. On the last

day this tapping is almost continuous. I have noticed the same thing with the Green and Great Spotted Woodpeckers.

There are three interesting points in the article which, so far, I have not experienced myself. The L.S.W. beating the insides out of the caterpillar is most interesting. The emptying of the damp sawdust out of the hole shows distinct intelligence on the part of the woodpecker. Most probably after the hole was dry it would knock more sawdust off the sides to take the place of that which had been thrown away. The bird returning to the nest with food after the young had left is peculiar and hard to explain. It is possible that one of the young birds may have died and that the old bird did not realize this at the time. I have never seen this happen myself, but it may be because by the time the young have left the nesting hole, I have already exceeded the time limit.

All times mentioned above are Greenwich mean time.

In Memoriam

SIDNEY H. SMITH

(Obit. September 14th, 1942.)

THE death at the age of 60 of Sidney H. Smith, in a nursing home at York (of which City he was a native) has bereft the Yorkshire Naturalists' Union of a richly endowed and highly esteemed worker, whose activities covered 35 years.

He was a member of the Vertebrate Section since its first meeting on December 14th, 1907, and was President of the Section in 1921 and 1922. He was on the Mammals, Reptiles, Amphibians and Fishes and Wild Birds and Eggs Protection Acts Committees since their inception, being Chairman of the former from 1926-1938.

He acted as Recorder for the York district for many years, being an ardent observer, recorder and photographer, and the annual reports will lose appreciably by his demise.

Although his chief interest was in Ornithology he was well versed in Conchology, Botany and Entomology. His services as a Lecturer were always readily given, and his lectures, illustrated as they were with his own lantern slides, were highly appreciated. He was a prolific subscriber of illustrated articles to all the nature study journals.

He was a Fellow of the Zoological Society, a Past President of the York Naturalists' Society, a Councillor of the Yorkshire Philosophical Society, and Past Chairman of the Yorkshire Fisheries Board. His work on the life cycles of coarse fish and the status of the salmonidæ was extensive. He was the author of a book written around the life of Snowden Sleights, who was the last of the inland wild-fowlers of the Derwent Valley.

In the last war he served as armourer-sergeant of a battalion of the West African Regiment, and was stationed on the Gold Coast, where he spent his leisure studying nature in a new environment.

He was an excellent fishermen and game shot, and there were few parts of Great Britain that he did not explore in pursuit of sport or knowledge.

Although he eschewed politics he did not evade his duty as a citizen. He was a Justice of the Peace, a Founder member of the York Rotary Club and of the Wild Fowls Association, past Secretary of the York Chamber of Trade, the Commercial Development Committee, the York Assessment Committee, and in addition found time to take a great interest in Freemasonry, holding high Provincial honours.

A man of high courage, he held the Parchment of the Royal Humane Society for saving life in the whirlpool below the weir at Naburn on the River Ouse in July, 1920.

As a partner in the firm of J. H. Walker & Co., Ltd., Colliery Agents and Builders' Merchants, he was a shrewd business man.

With a keen sense of humour he was yet blunt, direct and open, hating cant and sham and never passive in any of his associations.

His death will leave a void in many hearts as well as places, for to know him was to love him. He leaves a widow and a son.—C. F. P.

THE ECOLOGY OF A HEATHER MOOR

CHRIS. A. CHEETHAM

At the meeting of ecologists on March 21st, under the auspices of the Yorkshire Naturalists' Union, it was agreed to begin to investigate the animal and floristic composition of *heather moor*. It was also decided that floristic composition should be recorded in 1 sq. metre quadrats, and that plots of 20 metres square should be used for insects. In the following account of a preliminary examination the records are given as percentages of the total number of plots on which the named plants were seen, while the insects are given as estimated numbers per sample plot of 20 metres square.

I thought this would be a simple matter to find a heather moor, with Ingleborough, Pen-y-ghent, and the Bowland Knotts near at hand, but I soon found that the heather (*Calluna*) seldom had less than 20 per cent. cotton grass, and generally was nearer 50 per cent. There is seldom much peat, but the underlying soil is clayey drift and the rainfall encourages the growth of cotton grass (*Eriophorum vaginatum*). After some searching I fortunately found a patch of pure heather (*Calluna*) on a north-facing slope at 850 ft. O.D. on Smearsett—on the 6-in. Ordnance Map it is called Smearsett Copys—it lies on Silurian rock at the base of the Mountain Limestone. It is 2 miles to the east of Austwick (500 ft. O.D.). Where rainfall and temperature figures are available, these show an average rainfall of 46 in. per year and an average temperature for the six winter months of 40° and for the six summer months of 54°.

Under the heather is a very thin peat layer, and this is mainly the result of heather and moss decay. Professor W. H. Pearsall has examined soil samples and kindly sent the following data :

SOILS FROM SMEARSETT COPYS (UNDER *Calluna*)

A series of three samples showing various thicknesses of peat up to 5 cm. (I), soils below either much stained with humus (II), or somewhat leached (III). Three samples are analysed in detail as representative.

A top —I
A bottom—II
C bottom—III

All showed strong base deficiency by Combers' thiocyanate test and were oxidising soils.

The pH values at top and at 10 cm. in the three samples were :

	A	B	C
Top.	3.70	3.76	3.62
At 10 cm.	3.83	3.86	4.46

Other data are :

Sample	Water Content. % of Dry Soil	Humus Content. % of Dry Soil	Ratio of Relative Humidity	
I Peat	259.5	82.6	3.14	} Spring (May) } certainly lower } in summer.
II Peaty soil	81.1	20.7	3.92	
III Partly leached soil	51.7	12.25	4.22	

Base deficiency by ammonium acetate method :

Sample	Replaceable ¹ Hydrogen	Replaceable ¹ Bases	Total Base ¹ Capacity	% Unsaturation	pH
I	69.6	6.02	75.62	92.2	3.70
II	17.75	2.41	20.16	88.1	3.82
III	12.56	18.63	31.19	39.3	4.46

¹ As milli-equivalents per 100 g. of soil (dry).

The three samples showed different stages in the development of a peaty soil—the peat covering being thin in C (2.3 cm.). It is probable that this represents a site on which *Calluna* moor is establishing itself. Sample III, for example, would be capable of supporting oak-wood on the evidence available.

The heather is about 12 in. high, and remains of old walls show that the area has been cultivated and gone back to heather moor. It is open to sheep which pasture on Smeasett (1,050 ft. O.D.) and which keep it cropped, and they introduce difficulties due to their dung, etc. The area is roughly 300 yds. in breadth and 150 yds. in depth, somewhat triangular, with sheep tracks which carry grasses (*Agrostis vulgaris*, *Festuca ovina*, *Aira flexuosa*, *Poa annua*, *Nardus stricta*, and *Molinia caerulea*) and other plants (*Juncus squarrosus*, *Carex binervis*, *Galium saxatile*, *Rumex acetosella*, and *Potentilla tormentilla*). These paths are narrow (12 in.) and are not taken into account when making up the percentage figures which show the number of plots (1 metre) on which the plants were noted. The chief moss is *Hypnum cupressiforme* var. *resupinatum* (60%), with *Hylocomium Schreheri* (10%), *Campylopus flexuosus* (10%), *Plagiothecium undulatum* (5%), *Weberia nutans* (1%). There is grass, but in very small quantity: *Festuca ovina* (30%), *Agrostis vulgaris* (5%), *Nardus stricta* (3%), also *Carex binervis* (3%). Bilberry (24%) is very thin and poor, Tormentil (12%), a lichen, *Parmelia physodes* (3%), and a fungus, *Collybia velutipes* (3%).

The birds living on the moor are Grouse (which do not seem to have nested this year) and Meadow Pipits, at least two nests. Rabbits and moles have also been noted. I have not included birds or insects which have been seen at odd times but which are certainly not living on the moor.

Grouse feed on the tips of the heather and on insects and larvæ, and the Meadow Pipits are generally searching for these, so it is essential to know the amount and species present throughout the season. The time of appearance is very restricted for many species and the weather acts quickly on the numbers taken on a visit. It must also be remembered that 1942 has been a very, very disappointing insect season, and one will have to repeat the investigation for several years to get a proper idea of the population of insects. The figures are estimated on a 20 metre square. I have not attempted to find out the larval story of the insects and these should provide a considerable amount of food for the birds. In April a midge, *Syndiamesa pilosa* Kieff. (800). *Sepsis cynipsea* L. (200), a restless species with a black spot on the wing-tip; this has been present all through the season. A sawfly, *Dolerus* sps., was flying April-August at its maximum (300). Dung flies, *Scatophaga* sps. (20), and flies living on decaying animal matter, *Coprophila vagans* Hal., *Phora urbana* Mg., and *Euphoria casarion*, about the same in number (20), and a fungus midge, *Boletina sciarina* Stæg. (800), and two other midges, *Spaniotoma minima* (Mg.) (20) and *S. perennis* (Mg.) (20). Other flies taken during April were *Chortophila æstiva* Mg. (200), *Hydrophoria divisa* Mg. (20), *Mydæa lucorum* Flin. (10), *Baliophora tripunctata* Flin. (50). In May *Bibio reticulata* Lw. (800) and the Common Heath Moth, *E. atomaria* (20) became frequent and was so through June. Caterpillars of this were fairly plentiful and some odd caterpillars of the Emperor Moth, *S. carpini*, were seen. In June the froth of *Philænus spumarius* (800), the so-called Cuckoo spit, the mature insect being very plentiful into September. In June an Ichneumon was fairly common. Mr. W. D. Hincks says this is *Agrypon flaviolatus* (20). Two other species need identification yet (5). In July a click beetle (20) was taken and an empid fly, *Rhamphomyia sulcata* Flin. (200). This is carnivorous both as larva and mature fly. A number of other species will be listed at a later date and will be added to records from other districts. In September an effort was made to sweep up all the insects on an insect plot, the number counted was 1,100.

This rough investigation will show that a great many visits at regular intervals and for a number of years will be necessary to get a knowledge of the insect fauna and its density.

FIELD NOTE

The Dark Green Fritillary in the Peak District.—As I have not met with references to the occurrence of fritillaries in the Peak District, it may be of interest to note the appearance during the present summer of the Dark Green Fritillary (*Argynnis aglaia* Linn.) in two localities, about half a mile apart, in the neighbourhood of Hathersage. The butterflies were on the wing, in moderate numbers, on sun-shiny days from the first week in July until the end of that month. A few tattered specimens were seen during the early days of August, but none later.—R. G. ABERCROMBIE, B.A., M.D.

CENSUS OF OCCUPIED ROOKERIES WESTERN HALF OF NORTH RIDING OF YORKSHIRE, 1942

J. P. UTLEY, B.Sc.

AREA	NESTS										KIND OF TREES SELECTED										ALTITUDE (Feet)					ASSOCIATED GEOLOGICAL FORMATION										
	Below 6. Average = 3	6—25 Average = 15	26—100 Average = 65	100—200 Average = 150	Above 200	Total	Estimated Total of Nests = Numbers of Breeding Pairs	Sycamore	Ash	Beech	Elm	Oak	Willow	Chestnut	Mixed	Total	Below 100	100—250	251—500	501—1000	Total	Carbon- iferous	Permian	Triassic	Jurassic			Recent	Total							
																						Carboniferous Limestone	Millstone Grit	Magnesian Limestone	Keuper and Bunter Sandstone	Keuper Marl	Lias	Oolite	Corallian							
Western Dales	10	36	14	1	1	62	1830	50			4	1		1	6	62		4	20	38	62	44	11	7												
Tees Drainage	4	7	5	2		18	742	12							6	18	1	4	8	5	18	9		5	4											
Vale of Mowbray	27	30	11	4		72	1846	49	8	3	2	1	2		7	72	7	52	13		72	9			8	29	17	7	1	1						
Plain of York	2	4	2			8	196	1	1	1		3			2	8	8				8				2	4				2						
Howardian Hills	8	7	10	1		26	929	16		4	1				5	26	1	13	12		26							8	8	9	1					
Total	51	84	42	8	1	186	5543	128	9	8	7	5	2	1	26	186	17	73	53	43	186	62	11	20	35	21	15	9	9	4						
Notes on Areas	Western Dales — Wensleydale—West of Bedale with tributary dales excepting Bishopdale and Raydale. Swaledale—West of Catterick Bridge but excluding all west of Downholme and excluding Arkengarthdale.																																			
	Tees Drainage — Yorkshire side west of Yarm, but excluding west of Barnard Castle.																																			
	Vale of Mowbray—Included area bounded by Tees watershed on north, Catterick-Bedale-Masham line on west, foot of Cleveland Hills on east Boroughbridge-Easingwold-Husthwaite line on south.																																			
	Plain of York —South of Vale of Mowbray to West Riding Boundary. By foot of Howardian Hills to East Riding Boundary. Howardian Hills—Coxwold to Malton by south of Coxwold-Gilling Gap and <i>via</i> Hovingham and Amotherby.																																			

REVIEWS AND BOOK NOTICES

Wild Life Through the Year, by Richard Morse. Pp. 158, with 16 colour plates, 40 photographs and many drawings (Black, 7/6). In comparatively small compass the author has given a clear and accurate summary of the more likely observations an instructed beginner may expect to make throughout a normal year. The matter is presented attractively, and the book is just the thing for the young naturalist. All the many illustrations are good, and the line drawings would prove most helpful to the teacher of nature-study.

Insect Pests in Stored Products, by H. Hayhurst, F.I.C., A.M.I.Chem.E. Photographs by Harry Britten, F.R.E.S. Pp. xii+108, with 54 full page plates. Second Edition. Chapman & Hall, 15/.

This is a second edition the first being published in 1940. The book has evidently filled a useful purpose and it is a publication which demonstrates the value of the first-hand knowledge of its authors. Nowadays, unfortunately, many books are simply compilations of facts from various books and journals, the so-called authors having little personal knowledge of the subject. It would be difficult to find many persons with the wide knowledge of insects possessed by Harry Britten or with the photographic skill which the illustrations show so clearly. H. Hayhurst's experience as a railway chemist has given him a vast knowledge of the many pests that attack our food stuffs and this he has put in a very readable form. The association of fleas and food materials seems somewhat remote and one does not understand the omission of the cheese fly or baccon fly pests though perhaps other meat flies are too well known to be included.—C.A.C.

NEWS FROM THE MAGAZINES

We learn from *The Museums Journal* that over a thousand skins of migrant birds, principally collected on the borders of the Wash in Lincolnshire by the late G. H. Caton Haigh, have been bequeathed to the British Museum (Natural History). Among the more interesting species are Radde's Bush Warbler, Evermann's Yellow-browed Warbler, Lanceolated Warbler, Buff-breasted Sandpiper, Sabine's Gull, and American Peregrine. On a plate in the same journal are views of (a) the City Museum, Leeds, immediately after partial destruction, and (b) the reconstructed temporary entrance.

The Entomologist for August contains 'Can indistinguishable specimens be of different species,' by G. J. Arrow; 'Miscellaneous notes on the butterflies of the Malay Archipelago,' by A. S. Corbet; 'British insects infested with Laboulbeniaceæ,' by H. Donisthorpe; 'The Bright Collection sale (Fourth portion),' by W. Rait-Smith; 'Gynandromorphism in *Theobaldia annulata* Schrank (Diptera, Culicidæ),' by E. W. Classey; 'Record of light traps at Bayonne, Basses Pyrenees France, S.W., 1931-1939,' by G. T. Adkin and numerous notes and observations.

The Entomologist's Monthly Magazine for August contains '*Madiza*: a chloropid or a milichid (Dipt.),' by C. W. Sabrosky; 'Note on Mr. Sabrosky's article on *Madiza* (Dipt.),' by J. E. Collin; '*Catopidius depressus* Murray in Britain (Col. Silphidæ),' by K. G. Blair (taken on an office window, Gravesend, lives in burrows of rabbits and badgers); 'The British species of the genus *Chamæmyia* (Dipt. Chamæmyiidæ),' by R. L. Coe (with figs.); 'The character of the nodal complex in the Synthemistinae (Odonata),' by F. C. Fraser; 'Results of the Oxford University Expedition to Sarawak (Borneo), 1932 (Col. Anthribidæ),' by K. Jordan; and several shorter notes.

The Entomologist's Monthly Magazine for September contains 'Laboulbeniaceæ and Ants,' by H. Donisthorpe; 'Notes on Irish Siphonaptera, V,' by E. O'Mahony; 'Notes on the early stages of three Pentatomidæ (Hem.) (with figs),' by E. I. McGill; 'Larvæ of British Beetles: III, Keys to the families,' by F. I. Van Emden, and numerous shorter notes.

The Entomologist for September contains: 'A new species of *Bhutanitis* (Lep. Papilionidæ),' by A. G. Gabriel; 'A matter of pigment,' by A moth gossip; 'A list of Serphinae collected in South Sweden (*Hym. Serphoidea*),' by J. F. Perkins; 'Notes on the males of *Cryptoserphus* together with the description of a new species (*Hym. Serphoidea*),' by G. E. J. Nixon; 'Record of light traps at Bayonne, Basses Pyrenees, France (S.W.) 1931-1939,' by G. T. Adkin; and numerous notes and observations.

YORKSHIRE NATURALISTS AT HORTON IN RIBBLESDALE

THE Whitsuntide meeting, May 23rd to 25th, was arranged to be held at Tadcaster, and this was printed on our member's card, but staff and catering troubles at the Hotel made this impossible, and the Meeting was held in Ribblesdale, where 36 members or associates, representing 16 Societies, were present.

Our President was not able to be with us owing to his removal to Aberdeen, but Mr. Ralph Chislett, the previous Zoological President, took the Chair at this and at other subsequent meetings.

The weather was not favourable, Saturday, when we visited the Moughton area, including Thieves Moss and Sulber Nick, was fine, but on Sunday, on Pen-y-ghent the strong wind made it impossible to work on the crags, and on Monday a really wet day upset the trip to Helwith Moss, but resulted in possibly the most interesting record of the week-end.

Some years previously your Secretary saw a plant of the Gothland Sandwort, *Arenaria gothica* Fr., in Foredale limestone quarry at Helwith, and a few members visited this and found the plant quite plentiful now. We also saw a few plants on Moughton in the Juniper Valley, and a fresh station has been noted on Long Scar, Norber. These places are all some distance to the south of the places where the plant was first discovered in 1889. Older botanists remember seeing it very plentifully on the Station roadway at Ribblehead and on the road from there to Ingleton; it has gone from here for some years. The other old stations on the Selside-Clapham track still have the plant, and now we find it at Helwith six miles south of the original locality. Both the Helwith and Moughton stations are not connected in any way with tracks to help in the conveyance of the seeds.

Botany (A. Malins Smith): In this rich district many rare and unusual plants were seen, the following being most noteworthy: *Arenaria gothica* Fr., *Polystichum lonchitis* (L.) Roth., *Antennaria dioica* (L.) Gaert., *Primula farinosa* L. and *Dryopteris rigida* Underw. on Moughton Fell; *Saxifraga oppositifolia* L., *S. aizoides* L., *Draba incana* L., *Sedum roseum* (L.) Scop., *Solidago virgaurea* L. var. *cambrica* on Pen-y-ghent; *Andromeda polifolia* L., *Potentilla palustris* (L.) Scop. and *Oxycoccus quadripetalus* Gilib. on Helwith Moss. Prof. Pearsall observed the following species and hybrids of willow by the river: *Salix phylicifolia* L., *S. purpurea* L., *S. atrocinnerea* Brot. and *S. aurita* L. (Helwith Moss), *S. phylicifolia* × *aurita*. *Alchemilla hybrida* Mill. (*A. pubescens* Lam.) and *A. pratensis* Schmidt. were frequent on the Mountain Limestone. A visit to Colt Park Wood yielded *Actaea spicata* L., *Convallaria majalis* L., *Polygonatum officinale* All., *Paris quadrifolia* L., *Trollius europæus* L., *Rubus saxatilis* L., *Potentilla Crantzii* Beck., and *Viola lepida* Jrd.

Ecology.—The Moughton juniper was examined and changes in the plots noted. They show the same tendency as was more strikingly shown in the Thieves Moss area three or four years ago, where bushes died out over a large area. Around the plots the retrogressive tendency is going on more slowly but is clearly evident; no seedlings or young plants were found. In Colt Park, as in 1930, no seedlings of the dominant tree, Ash, were seen, and those of other trees and shrubs were very scarce. The cause is animal attack—probably rabbit pressure, though sheep may play a part. This is shown by the removal of bark at the base, the Mountain Ash suffering most.

An exception to this absence of young plants was seen on the vertical face of the limestone cliff on the east, where young growths were frequent in any nook or cranny where soil could collect, these places being inaccessible to sheep or rabbits.

Pen-y-ghent.—Here, on the northern ridge, interest centred on the mixed character of the peat vegetation *Sphagnum*, two species of Cottongrass, Cloudberry, Bilberry, Cowberry and Deergrass occurred in any area of a couple of square yards. The absence of a dominant plant and the amount of Cowberry were notable.

It is not uncommon in these hilly regions of high rainfall to find plants, which in regions of lower rainfall grow in the shade of woodland, extending widely in open grassland such as Wood Anemone and Wood Cranesbill. To these may be

added the Great Woodrush, which is found on the higher slopes of Pen-y-ghent and Fountains Fell far removed from any tree shade.

Fungi (W. G. Bramley) : Except for a few hours in Ling Ghyll little was done among the fungi, the weather not being suitable for the collection of much except water beetles, to which task the writer was degraded for two days. Many of the uredines were only just appearing, agarics were few, and only two or three were determined. The following list is the more interesting of those collected :

(L = Ling Ghyll ; H = Helwith Moss ; P = Pen-y-ghent.)

Trichia varia Pers. L., H.

T. botrytis Pers. L., H.

Perichæna corticalis Rost. L.

Peronospora grisea Unger. On *Veronica beccabunga*.

P. schleideni Unger. On *Allium* L.

Rhytisma andromidæ (Pers.) Fr. On *Andromeda* H.

Lophodermium juniperinum de Not. On Juniper, Moughton Scar.

Helminthosphaeria corticiorum von Höhnelt L. New to Yorkshire. Growing on

Peniophora cremea (cert. E. W. Mason).

Ophiobolus acuminatus (Sow.) Duby. Common on old thistle stems.

Pseudovalsa lanciformis (Fr.) Ces. & de Not. On Birch. L.

Diatrype bullata (Hoffm.) de Not. H. (cert. E. W. Mason.)

Melampsora rostrupii Wagner. I on *Mercurialis*. L. Only one infected plant was seen, and no *Populus*, but Prof. Pearsall informs me that occasional trees of *P. tremula* occur in some of the ghylls.

Gymnosporangium clavariæformis D.C. III on Juniper, frequent on Juniper, Moughton.

Uromyces valerianæ (Schum.) Fckl. OI on *V. dioica* L.

U. ficariæ (Schum.) Lév. L., H.

U. poæ Rabenh. OI on *Ran. ficariæ*. L., H.

Puccinia major Dietel. OI on *Crepis paludosa* L.

P. chondrillæ (Pers.) Corda. OI on *Lactuca muralis* L.

P. betonicæ D.C. L.

P. saniculæ Grev. II, III. L.

P. tumida Grev. L. Frequent.

P. violæ (Schum.) DC. OI on *V. riviniana*.

Collybia velutipes (Curt.) Fr. L.

Omphalia umbellifera (Linn.) Fr. H. Frequent.

Panæolus papilionaceus (Ball) Fr. L.

Mycoleptodon fimbriatum (Pers.) Bourd. H.

Peniophora cremea Bres. L.

Solenia anoloma (Pers.) Fr. L.

Conchology (Mrs. E. M. Morehouse) : It was perhaps the cold winds and the heavy rains which prevented more species being found. As was to be expected, *P. rupestris* Drap. was seen in quite good numbers on the walls in the village of Horton-in-Ribblesdale, as well as *Balea perversa* L. The latter was only sparsely represented. Slugs were not plentiful, and the larger helices were practically non-existent ; only odd ones here and there were noted. *A. arbustorum* L. seems to dominate even on the slopes of Pen-y-ghent.

The following key will explain where species were taken : (1) Horton-in-Ribblesdale ; (2) Ling Ghyll ; (3) Pen-y-ghent ; (4) Helwith Moss ; (5) Colts' Park.

Arion ater L. (3).

Agriolimax agestis L. (1).

Limax maximus L. (1).

Vitrea cellaria Müll. (1, 3, 5).

Vitrea alliaria Mill. (1, 3, 5).

V. nitidula Drap. (1, 5).

V. pura Alder. (5).

Jamnia cylindracea Da Costa. (1, 3, 5).

Pyramidula rupestris Drap. (1).
P. rotundata Müll. (1, 5).
Hygromia hispida L.
H. rufescens Pennant. (2).
Arianta abustorum L. (2, 3, 5).
Helix nemoralis L. (5).
Clausilia bidentata Ström. (5).
C. cravenensis Taylor. (5).
Balea perversa L. (1).

Acroloxus lacustris L. (3).
Cochlicopa lubrica Müll. (3, 5).
Vallonia pulchella Müll. (3, 5).
Limnæa pereger Müll. (4).
L. palustris Müll. (4).
Planorbis spirorbis L. (4).
Pisidium nitidum Jenyns. (4).
Carychium minimum Müll. (5).
Vitrina pellucida Müll. (5).

- **Ornithology** (R. Chislett) : The following relates to the birds seen between May 23rd and 31st in the part of Ribblesdale lying between Colt Park and Ling Gill above Horton, and Helwith Bridge below. High-lying moor and crag, ghylls and wooded ravines, juniper slopes and upland pastures, cultivated fields, lower-lying mosses and swamps along the riverside, all contributed their appropriate species. The species identified were : one Raven, several Carrion Crows, a small colony of Rooks, Jackdaw, Magpie—a nest seen with young, numerous Starlings, Lesser Redpole (scarce), Chaffinch (wherever there were trees), House Sparrow, Skylark (nest with young seen), Meadow Pipit (many nests with eggs seen), Yellow Wagtail—numerous, and ranging from the riverside up to 1,700 feet altitude, Pied Wagtail (scarce), Great Tit, Blue Tit, Spotted Flycatcher (one pair), Willow Warbler (wherever there were trees), Song Thrush (scarce, but a bird was spotted sitting), Ring Ousel (numerous on both upper sides of the dale, and two nests were found), Blackbird (numerous—two nests seen), Wheatear (numerous—one nest seen), Redstart (two pairs), Robin (one only), Wren (several), Dipper, Swallow, House Martin, Sand Martin, Swift (all numerous), Kingfisher (one bird), Cuckoo, Kestrel (nest with six eggs seen in a ghyll), Tufted Drake (one on the tarn), Stockdove (in the rocks), Golden Plover (nest seen with four eggs), Lapwing (several nests seen—one bird sat within 200 yards of the hotel), Dunlin (one by the tarn and another on Fountain's Fell), Sandpiper (two nests of four eggs seen), Redshank (several pairs had young), Curlew (three nests of four eggs seen), Snipe, Black-headed Gull, Lesser Black-backed Gull, Grouse (several nests seen averaging clutches of seven eggs), Common Partridge (one pair).

Forty-five species identified with certainty was quite good for a high-lying moorland district. That we failed to record a Grey Wagtail, or to identify any species of Owl, or a Merlin was surprising, as also was the abundance and range of the Yellow Wagtails.

Entomology (W. D. Hincks) : The early date of the meeting combined with the late season and inclement weather, did not favour entomological work, and as the sweeping net could not be used many familiar species escaped notice. My personal bag, notwithstanding, amounted to 556 specimens, due in no small measure to the active co-operation of Mr. W. G. Bramley, and to a concentration of effort on the aquatic fauna of many small peat bog pools. Mr. Wood joined the party on two days, and some of his captures, in addition to my own, are included in this report. We were fortunate in having the company of Mr. T. Stainforth, whose presence compensated for our small numbers, and as we co-operated closely in the field it is probable that his captures were very similar to my own.

Probably the most interesting item was the discovery by Mr. Stainforth of the larvæ and cocoons of *Plateumaris discolor* Panz.¹ among the roots of the Narrow-leaved Cotton-grass (*Eriophorum angustifolium* Roth.) in a small peat bog pool on Pen-y-ghent at about 1700 ft. We were able to collect both young and fully-grown larvæ together. Many of the cocoons taken contained a whitish indeterminate mass probably consisting of diseased pupal remains. Other cocoons contained healthy pupæ, but oddly enough (in the light of experience with lowland *Donacia* and *Plateumaris*) no adult beetles awaiting the summer emergence.

The life history of the Donacines is well known and adequately described and is interesting because of the utilisation by the larvæ of intercellular air contained in the stems and roots of the aquatic plants to which they attach themselves, below

¹ My tentative field determination has since been confirmed by the discovery of adults at the same station in early July.

the surface of the water, by means of special hooks which enable them to tap the supplies of air within the plants.

Other beetles were not plentiful with the exception of the aquatic forms and stercoricole species. *Hymenoptera* were very disappointing except for a few species of Sawflies and some *Ichneumonidæ* in Ling Ghyll, in which locality occurred *Philopotamus montanus* Don., the only Caddis-fly of the whole excursion. Mayflies were not abundant and represented largely by subimagines of well-known forms. Stoneflies were much more plentiful, but none of the species taken appear to be unrecorded from the locality. Very few Butterflies were seen, and no Dragonflies whilst *Hemiptera* were almost non-existent except for a few *Corixas* in the small pools. *Diptera* were not numerous with the exception of some *Chironomidæ*, some delightful little *Psychodidæ* in Ling Ghyll, and Crane-flies.

In the lists which follow I have generally not included species recorded by Mr. J. M. Brown and co-workers in the report of the Union's previous visit to Horton (*The Naturalist*, 1930, 297-300, 333-338). I am able to record five species as New to the County and eight additions to the Vice-county lists, and my thanks are due to Dr. W. J. Fordham for information in this connection. I wish to acknowledge also the kind assistance of the following in the determination of material: Professor F. Balfour-Browne (Aquatic Coleoptera), Mr. R. B. Benson, of the British Museum (Sawflies), Mr. Claude Morley (Ichneumons), and Mr. J. M. Brown (Stoneflies and Hemiptera).

The material on which this report is based will be deposited in the Yorkshire Museum, York.

I.—A PRELIMINARY SURVEY OF THE AQUATIC COLEOPTERA OF THE PEN-Y-GHENT AREA.

All the specimens have been determined by Professor Balfour-Browne, and I am also indebted to Mr. Bramley for considerable help in the collection of material.

For the sake of greater completeness I have added a few further gatherings made in early July, when it was noted that most of the peat-bog pools had dried out.

Collections were made at the following stations:

- A. Selside Moss (23rd). Peat-bog pools.
- B. Pen-y-ghent (24th), at about 2000 ft. Peat-bog pools.
- C. Pen-y-ghent (24th), at about 1700 ft. Peat-bog pools.
- D. Pen-y-ghent (24th), at about 1200 ft. Detritus pond.
- E. Helwith Moss (25th). Peat-bog pools and detritus ponds.
- F. Two small ponds near Tarn above Horton (26th). One pond artificial with *Chara*, etc. The other a detritus pond.
- G. Small tributary of River Ribble (26th).
- H. Dauk Ghyll (30/6, 1/7). Partly dried-out beck.
- I. Selside (1/7). Partly dried-out beck.
- J. Stream near Alum Pot (1/7).
- K. Pen-y-ghent, small tarn at about 1500 ft. (3/7).
- L. Pen-y-ghent, small waterfall at about 2000 ft. (3/7).
- M. Tarn above Horton (6/7).
- N. Artificial pond near Tarn (as F.) (6/7).

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
<i>Haliphus confinis</i> Steph.													6	1
<i>H. obliquus</i> Fabr.														3
<i>H. lineatocollis</i> Msh.								2						
<i>H. ruficollis</i> DeG.					2									
<i>Deronectes elegans</i> Pz.								2					9	
<i>Oreodytes borealis</i> Gyll.								39		2				
<i>O. rivalis</i> Gyll.								1						
<i>Hydroporus lepidus</i> Ol.						6							1	7
<i>H. tristis</i> Pk.	19	6	3	2	4	4								
<i>H. umbrosus</i> Gyll.					3									
<i>H. gyllenhali</i> Schdte.	11		1	28	9									
<i>H. morio</i> Aube	2	30	12	15										

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
<i>Hydroporus striola</i> Gyll.														I
<i>H. palustris</i> L.						25							6	18
<i>H. erythrocephalus</i> L.					2	3								3
<i>H. melanarius</i> Stm.				I										
<i>H. obscurus</i> Stm.		2			4									
* <i>H. nigrita</i> F.						I								
* <i>H. discretus</i> Frm.				I										
<i>H. pubescens</i> Gyll.	10	I	3	16		3								I
<i>Agabus guttatus</i> Pk.								I	I					
<i>A. congener</i> Th.				2										
<i>A. sturmi</i> Gyll.				I	19									
<i>A. bipustulatus</i> L.				4	7					I	I			4
<i>Ilybius fuliginosus</i> L.							I							2
<i>Gyrinus natator</i> L.												2		
<i>Limnebius truncatellus</i> Th.								4						
<i>Helophorus aquaticus</i> L.		I				I			I					
<i>H. viridicollis</i> Stph.			5	I	I	I	10							
<i>Hydrobius fuscipes</i> L.			I											
<i>Anacaena globulus</i> Pk.		2		I		I							6	
<i>A. limbata</i> F.						13								

II.—OTHER COLEOPTERA.

- Clivina fossor* L. Slopes of Pen-y-ghent (24th), banks of River Ribble (26th).
C. collaris Hbst. Banks of River Ribble (26th).
 **Bembedion bipunctatum* L. Ling Ghyll (23rd).
B. ustulatum L. Banks of River Ribble (26th).
Patrobus atrorufus Stroem (= *excavatus* Pk.). Ling Ghyll (23rd), Horton (25th, 26th).
Feronia strenua Pz. Horton (25th).
Cercyon impressus Sturm. Ling Ghyll (23rd). Slopes of Pen-y-ghent (24th).
C. haemorrhoidalis F. Slopes of Pen-y-ghent.
C. melanocephalus L. Ling Ghyll, Pen-y-ghent, at 2000 ft., Horton (25th).
Cryptopleurum crenatum Pz. (Introduced to the British List in 1939 and recorded from V.C.64 (Kearby) by Tottenham.) Slopes of Pen-y-ghent, one spn.
Thanatophilus rugosus L. Ling Ghyll, on dead Sheep.
Nargus watsoni Spence, Horton (25th). On dead Lapwing.
Anthobium torquatum Msh. Ling Ghyll.
Omalium rivulare Pk. Ling Ghyll, on dead Hedgehog.
Deliphrium tectum Pk. Horton (25th), on dead Lapwing.
Oxytelus laqueatus Msh. Ling Ghyll.
 (*Dianous coerulescens* Gyll. Dauk Ghyll, High Birstwith, Ling Ghyll, in early July (W. D. H. and W. O. Steel).)
Xantholinus linearis Ol. Slopes of Pen-y-ghent.
Othius punctulatus Goeze. Slopes of Pen-y-ghent.
Philonthus cephalotes Grav. Ling Ghyll.
P. puella Nordm. Horton, banks of River Ribble (26th).
Creophilus maxillosus L. Ling Ghyll, on dead Hedgehog.
Quedius molochinus Grav. Horton (25th).
Q. boops Grav. Slopes of Pen-y-ghent.
 (*Q. auricomus* Kiesw. Dauk Ghyll, early July (W. D. H. & W. O. Steel).)
Tachyporus chrysomelinus L. Dauk Ghyll (22nd).
Tachinus rufipes DeG. Horton (25th), on dead Lapwing.
Aleochara curtula Goeze. Ling Ghyll, on dead Hedgehog.
A. lanuginosa Grav. Slopes of Pen-y-ghent.
Epurea deleta Sturm. Dauk Ghyll (22nd).
Corymbites incanus Gyll. Horton (26th).
Octotemnus glabriusculus Gyll. Ling Ghyll, in *Polystictus*.
Aphodius depressus Kug. Ling Ghyll. Slopes of Pen-y-ghent.
A. ater DeG. Ling Ghyll. Slopes of Pen-y-ghent. Pen-y-ghent at 2000 ft.
A. spacellatus Pz. (= *punctatosulcatus* Stm.). Ling Ghyll.
A. aestivalis Steph. (= *foetens* auct.). Horton (26th).

- Aphodius lapponum* Gyll. Slopes of Pen-y-ghent. Pen-y-ghent at 2000 ft.
 **A. putridus* Hbst. Pen-y-ghent at 2000 ft.
Plateumaris discolor Pz. Larvæ and cocoons in plenty attached to roots of *Eriophorum angustifolium* Roth. In peat-bog pools on Pen-y-ghent at 1700 ft. approx. (Adults in same station on 3rd July; also at 1500 ft. on western side of Pen-y-ghent on same day and on slopes of Simon Fell on July 1st.)
Hydrothassa aucta F. Horton (26th).
Psylliodes napi F. Ling Ghyll.
Phyllobius pyri L. Ling Ghyll.
Barynotus moerens F. Ling Ghyll.

III.—HEMIPTERA.

- Anthocoris nemoralis* F. Horton (26th).
Acanthia c-album Fieb. Horton (26th).
 **Sigara castanea* Thoms. Selside Moss (23rd).
S. wahlbergi Fieb. Selside Moss, Helwith Moss (25th).
 **S. wollastoni* D. & S. Pen-y-ghent at about 1200 ft. (24th).
Gerris costæ (H. S. Pen-y-ghent at about 1200 ft. (24th).
G. thoracicus Schm. Pen-y-ghent at about 1200 ft. (24th).
Euscelis sordidus Ztt. Pen-y-ghent at about 1200 ft. (24th).

IV.—HYMENOPTERA.

ACULEATA :

- Andrena jacobii* Perk. Ling Ghyll.
A. trimmerana Kirby. Horton (26th).
Nomada marshamella Kirby. Ling Ghyll.

ICHNEUMONIDÆ.—In naming this material Mr. Morley rightly comments on it as 'a very obscure lot.'

- **Ichneumon raptorius* Grav. Ling Ghyll (J. Wood). Previously only recorded from the county as 'Yorkshire, S. L. Mosley' (*Trans. Y.N.U.* 1880, 103).
I. confusorius Grav. Ling Ghyll (J. Wood).
 †*Pezoporus (Microcryptus) tricoloratus* Grav. Ling Ghyll.
 **Phygadeuon rugulosus* Grav. Ling Ghyll (J. Wood).
Hemiteles necator Grav. Ling Ghyll (*V.C. 64, Thorner, 13/4/41, W.D.H.).
 †*H. floricator* Grav. Ling Ghyll (J. Wood).
H. æstivalis Grav. Ling Ghyll (J. Wood).
Pimpla turionellæ L. (*sensu* Morley). Ling Ghyll.
 †*Diplazon (Bassus) variicoxa* Thoms. Ling Ghyll.
 †*Promethus monticola* Snell. (= *laticarpus* Thoms.). Ling Ghyll (J. Wood).
Phobocampa crassiuscula Grav. Ling Ghyll (J. Wood).
 †*Sagaritis holmgreni* Tsch. Ling Ghyll (J. Wood).

TENTHREDINIDÆ.—All the following specimens have been determined by Mr. R. B. Benson.

- Dolerus madidus* Klug. 1♂, Pen-y-ghent (24th), 1♀, Horton (26th).
D. gonager F. 1♀, Ling Ghyll (23rd).
D. possilensis Cam. 1♀, Ling Ghyll; also 2♀♀ (J. Wood).
D. picipes Klug. 1♂, Ling Ghyll (J. Wood).
D. nigratus Müll. 1♀, Ling Ghyll (J. Wood).
D. æneus Htg. 3♂, 3♀, Ling Ghyll; also 3♀ (J. Wood).
D. rugosulus D.T. 1♀, Ling Ghyll; 1♀, Helwith Moss (25th).
Protemphytus pallipes Spin. 1♀, Ling Ghyll (J. Wood).
Empria klugi Steph. 2♀, Ling Ghyll (J. Wood).
E. tridens Konow. 2♂, Ling Ghyll; also 1♂ (J. Wood).
Blennocampa geniculata Htg. 1♂, Horton (22nd).
B. tenuicornis Klug. 1♂, Ling Ghyll; also 1♂ (J. Wood).
Athalia lineolata Lep. 1♀, Horton (26th).
A. cordata Lep. 1♂, 1♀, Ling Ghyll; also 1♀ (J. Wood).
Euura sp.? 1♂, Horton (26th).
Pontania sp.? 1♂, Horton (26th).
Pteronidea oligospila Först. 1♀, Horton (26th).

YORKSHIRE NATURALISTS AT SOUTH CAVE

THIS meeting was well attended by Hull members and associates, but transport difficulties prevented many from the West Riding getting there. We were fortunate in having Mr. C. F. B. Shillito to take charge of the Geological Section and Mr. C. W. Mason to guide the rest of the party. On the railway sides Ladies' Fingers, *Anthyllis vulneraria*, made a striking show and was helped by a number of the Wood Tiger Moth flitting around, and another common plant, the Mouse-ear Hawkweed, *Hieracium pilosella* L., was exceptionally plentiful on the somewhat stony hillsides, this being accompanied by the Common Blue Butterfly.

Ornithology.—Mr. G. H. Ainsworth says: The warm windless day with clear light was ideal for the ornithologist, and especially was it so for listening to bird song.

Back and forward over the station flew a pair of anxious Redshanks, constantly calling their clear 'tew-lee' cry. Sandmartins were wheeling above the quarries. Nesting Yellow Hammers and Meadow Pipits feeding young were seen along the road. In the Drewton lane below the quarry near the railway the 'ti-seep' of a Wagtail was heard—possibly a Pied Wagtail, as a pair had been seen in the quarry some weeks previously. Six Turtle Doves, a Stock Dove, and a Ring Dove were drinking in the stream which flowed parallel to the lane. Green Plovers were numerous, and for some time a sharp attack was made by two pairs on a Kestrel which had approached too near to the nesting site.

By the rabbit holes above the railway cutting a pair of Wheatears were feeding young, and further along the path another pair were thought to have a nest in the rabbit holes near which they were flitting. A male Kestrel was flushed from a tree in East Dale, and close by the female was sitting on two eggs. A Tawny Owl, evidently dreaming in the warm sunshine, was watched for some time. Along Drewton Dale Spotted Flycatchers were numerous and four pairs were seen.

The clear warble of the Blackcap was heard four times along the dale. A male Blackcap singing in the wood changed the warble to a warning 'tac, tac' when under observation. The Blackcap's clear notes could be compared with the Garden Warbler's sweeter and more prolonged melody, as on more than one occasion these two birds were singing together. Garden Warblers are numerous in the district. Greater Whitethroats were heard, and the Willow Wren's sweet cadence sounded all along the dale. A pair of Lesser Redpolls flew twittering above the hedge. The metallic notes of the Great Titmouse and the high 'si-si' of the Goldcrest came from the fir trees and a Tree Pipit gave his ringing melody as he soared from and glided down to a bush on the outskirts of the wood. Young Blackbirds, Chaffinches and Pheasants were noticed, while the Common Bunting, which is so ungainly in flight with its lowered legs, made a rattle of a song. Greenfinches were common and one nest with five eggs was found. On the gamekeeper's larder were two Little Owls, a Magpie, two Kestrels, and a Sparrowhawk in company with Carrion Crow, Stoat, and Weasel. Black-headed Gulls and Herring Gulls were feeding in the ploughed fields and a Snipe was put up near some marshy ground, while Swifts, Swallows, and House Martins hawked over the village as we left for home.

YORKSHIRE NATURALISTS AT BOROUGHBRIDGE

THE meetings in both of the northern divisions of the county, V.C. 62 and 65, were restricted by the absence on war duties of our Divisional Secretaries, Miss Rob and Captain Utley, and we tried to get both meetings as nearly central as possible. Across the Ure at Boroughbridge and to its junction with the Swale at Myton Ings we were in V.C. 65 and on ground the Union has not visited previously. When the Entomological notes are published later it will be seen that the ground was very promising, especially the first mile from the river bridge.

Botany.—Mr. A. Malins Smith writes: *Stellaria aquatica* (L.) Scop., occasional, *Carduus crispus* L. and *Myosotis palustris* Hill, common, are apparently new records for the R. Ure. *Hesperis matronalis* L., common, is on

record only near Ripon, and in 1883 Slater added 'does not seem to be there now.' It appears as if collectors had paid much more attention to the Ripon district than to that round Boroughbridge, for several of our finds are previously on record only for Ripon and above, e.g. *Cerastium arvense* L., *Allium scorodoprasum* L., *Reseda lutea* L., *Poterium sanguisorba* L., *Carduus nutans* L., *Campanula glomerata* L., and *Origanum vulgare* L. The river banks provide a suitable habitat for these lime-loving plants in a non-calcareous district, because of soil washed down from the limestone tracts above. It was in this way that the contrast between the lime-loving plants of the riverside and the weeds of the cultivated fields nearby arose, and especially *Spergula arvensis* L., a plant of acid soil, had its origin. The presence of the two species of *Carduus*, *crispus* and *nutans*, rendered possible the occurrence of the hybrid between them, and one such plant was found.

Nasturtium sylvestre R. Br., *Allium oleracium* L., *Scirpus sylvaticus* L., by the river, and *Bryonia dioica* Jacq., *Cornus sanguinea* L., and *Pimpinella major* (L.) Huds., in the hedgerows at Milby, were also found. The most abundant willow by the river was *Salix purpurea* L.

Fungi.—The following are the more notable records of the fungi collected. The area covered by the writer only extended some hundred yards beyond the canal junction. († New to Yorkshire; * Not listed in Catalogue for V.C. 65.)

**Peronospora grisea* Unger. On *V. beccabunga*.

†*Ceratostomella vestita* Sacc. det. E. W. Mason).

Ophiobolus acuminatus (Sow.) Duby.

**Melanconis alni* Tul.

**Helminthosphaeria corticidrum* von Höhn. Only previous record from Horton-in-Ribblesdale, 23-5-1942.

**Cryptodiaporthe salicina* (Cun.) Wehm.

**Ustilago longissima* (Sow.) Tul. On *Glyceria aquatica*.

**Uromyces ambiguus* (DC.) Lévl. On *Allium scorodoprasum* (coll. A. M. Smith).

Puccinia carduorum Jacky. II, III on *C. crispus*.

P. pimpinellæ Mart. OI, II, III on *P. majus*.

**P. conii* Fckl. II, old III on *C. maculatum*.

**P. holcina* Enkss. II on *Holcus*.

Cryptodiaporthe is not listed in Catalogue, but the species may be included under *Cryptosporella populina* (Fckl.) Sacc. It is not uncommon on twigs and branches of *Salix* sp.—W. G. Bramley.

Ornithology.—Mr. R. Chislett, who led the Vertebrate Section and took the chair at the meeting later on, says: The Ornithological party completed the allotted route from Boroughbridge down the north bank of the Ure to the confluence with the Swale, along the Swale towards the Myton bend, then back across fields to Boroughbridge. These river banks should have migratorial interest from August to October, and again from March to May.

The birds seen were Rook, Jackdaw, Starling, Greenfinch (very plentiful), Lesser Redpole, Linnet, Chaffinch (one only), House Sparrow, Yellow Bunting, Reed Bunting (a number of cocks were singing and the entomologists turned up a nest with five eggs), Skylark, Meadow Pipit (one), Pied Wagtail (a hen and an immature bird apparently moving down river), Great Tit, Spotted Flycatcher, Willow Warbler, Sedge Warbler, Whitethroat, Mistle Thrush, Song Thrush (a number of single birds fitted across to and from riverside bushes), Blackbird, Hedge Sparrow, Swallow (fairly plentiful), Martin (scarce), Sand-martin (numerous and nesting in the banks), Swift, Kingfisher (one), Cuckoo, Wood Pigeon, Lapwing (obviously still with flightless young), Black-headed Gull, Moor Hen (two holed and highly incubated eggs were seen lying side by side in grass), and Common Partridge.

At the meeting the plentitude of Greenfinches and comparative scarcity of Chaffinches was confirmed by members from Ripon who remarked that flocks of Chaffinches are more numerous in the district in winter than is the case with Greenfinches.

At the meeting a vote of thanks, moved by Mr. J. Digby Firth, was passed to those who kindly gave us the necessary permissions, Mr. H. H. Hawkins, of Ellenthorpe Lodge, and Mr. C. H. Wilkinson, of Milby.

YORKSHIRE NATURALISTS AT CLIFTON INGS

A WET unpleasant morning and travel facilities made this into the worst attended meeting of the session, but those who carried out the programme under Mr. E. Wilfred Taylor's lead seemed well pleased with the results, and interesting discussions were instituted by others who came to the meeting in the Museum later on where Mr. R. Wagstaffe welcomed the members.

Botany.—Miss M. Lee writes : As the name anticipates, the ground here is level meadowland bordering the River Ouse. It is intersected by drainage dykes, as it is frequently flooded when the river rises.

Walking along the river bank, several flourishing colonies of *Epilobium hirsutum* were noticed. *Tanacetum vulgare*, *Artimisia vulgaris*, and *Sanguisorba officinalis* were also plentiful. A good clump of *Saponaria officinalis* in full flower, and a variant of *Convolvulus arvensis* with flowers of deep, almost magenta pink, attracted special interest.

Although much of the hay crop had been taken from the meadows, here and there a piece of uncut ground yielded rich spoil. The landscape was strikingly patched with the profusion of *Thalictrum flavum*, *Geranium pratense*, *Reseda luteola*, *Galium verum*, and *Polygonum bistorta*, with the added beauty of several handsome plants of *Carduus nutans*. *Allium vineale*, *Allium oleraceum*, and *Campanula glomerata* were also gathered here.

The various ditches yielded *Alisma plantago-aquatica* and *Butomus umbellatus*, both in prime flower, and some exceptionally fine *Valeriana officinalis*.

Many of the same species were found here as on the banks of the Ure at Boroughbridge, among them *Geranium pratense*, *Reseda luteola*, *Campanula glomerata*, *Allium oleraceum*, and *Carduus nutans*.

Other plants seen were *Enanthe Lachenalii*, *Pimpinella saxifraga*, *P. major*, *Phalaris arundinacea*, *Lysimachia nummularia*, *Campanula latifolia*, *Scrophularia nodosa*, *Hesperis matronalis*, *Matricaria chamomilla*, *Achillea ptarmica*, *Lactuca muralis*, *Carduus arvensis*, *Ballota nigra*, *Solanum dulcamara*, *Vicia cracca*, *Rhamnus frangula*.

Ornithology.—Mr. Ralph Chislett says : Our route lay up the left bank of the Ouse from Clifton Scope for 2-3 miles, across the Ings at a narrow part, and back by the dyke, hedges and plantations bordering the rise beyond the Ings to our starting point. As with the botanists, we found it interesting to compare species noted with those seen along the banks of the Ure, near Boroughbridge, on June 27th. Here the Greenfinch, although noted, was not nearly so abundant.

Two pairs of Corn Buntings, numerous Yellow Wagtails, and some Whinchats, all obviously breeding, were noted. At least two pairs of Carrion Crows had young which had been reared in adjacent trees. By an aspen copse containing a few decaying trees a pair of Tree Sparrows were seen, and E. W. Taylor informed us that another pair have nested in an old tree nearer to Clifton Scope. High wind militated against bird observation, otherwise the list of 24 species identified would doubtless have been extended. The only birds heard singing were Corn Buntings, Reed Buntings, a Hedge Sparrow, and a Sedge Warbler. At one place where there were some scattered thorn bushes Mr. E. W. Taylor had heard the Lesser Whitethroat earlier in the season. The riverside must repay observations during the migration seasons, and among the species mentioned by E. W. T. as having been observed at such times were Red-necked Grebe, Common Scoter, Tufted Duck, Common Sandpiper, etc. Mr. A. Smith a week earlier had noted a pair of Hawfinches which, although possibly attracted by plants seeding abundantly, may have nested in a local tree.

YORKSHIRE NATURALISTS AT STOCKSMOOR, HUDDERSFIELD

WE were favoured with a fine day for the last of the year's excursions, and although the flora of these grit areas is restricted, Stones and Stocks Woods provided good ground for the various activities of the members who were present.

Botany.—Mr. W. E. L. Wattam writes: The area of investigation is a continuation of the area covered by the members of the Union on the occasion of their visit to the Kirkburton Valley in June, 1940. Reference can usefully be made to Circular 424 and the report upon this excursion appearing in *The Naturalist* for 1940, pp. 214-216. The geological factors are similar and the trees and ground flora but slightly different. The grass carpet was practically unbroken *Deschampsia flexuosa* (L.) Trin. with an occasional interspersing of *Deschampsia cæspitosa* (L.) Beauv. and *Agrostis tenuis* Sibth. Seedlings of Oak, Beech, Birch and Ash were abundant. A prominent feature in open glades was *Melampyrum pratense* L. var. *hians* Druce. Dr. Grainger pointed out the haustoria of this plant on the root system of *Deschampsia flexuosa*. The five species of ferns met with included *Blechnum spicant* (L.) With. and *Dryopteris Oreopteris* (Ehrh.) Max. Conspicuous flowers of the wayside banks were *Achillea Ptarmica* L. and *Lotus uliginosus* Schk. *Carex laxigata* Sm. was noted in one of the swamps. Lichens were represented by an abundance of *Parmelia saxatilis* Ach. and its variety *furfuracea* Schær. and a single specimen of *Pannaria rubiginosa* Del. on the sandstone walls, *Lecanora varia* Ach. on stems of *Calluna*, *Lecidia granulosa* Schær. prominent on the slight peat deposits and dead grass roots and *Lecidia contigua* Fr. on sandstone blocks by the streamside.

A NATURALISTS' CLUB DIAMOND JUBILEE

ON October 3rd the Leeds Co-operative Field Naturalists' Club met to celebrate the Club's Diamond Jubilee by a reunion at which some seventy people were present.

The speaker was Mr. W. R. Grist, B.Sc., F.C.S., who took as his subject, 'The Present Position in the Study of Bird-Migration.'

The President for the year and Hon. Life President, Mr. J. Digby Firth, who celebrated forty years membership of the Club in January last, stated that the Club's existence had been unbroken since it was founded in 1882, largely by the efforts of Benjamin Holgate (afterwards F.G.S.), who became its Life President. Prominent members of the Club's earlier years included Drake (minerologist), Dr. Arnold Lees, Dennison Roebuck, while Joshua C. Gration, J.P., the Club's first Hon. President, gave a great deal of encouragement in its work over a long period of years. The present membership includes those who have been stalwarts for many years, a band of capable young naturalists, and some younger, enthusiastic beginners, so that the future of the Club for some years to come would seem to be assured.

NATURE RESERVES INVESTIGATION COMMITTEE

THE Conference on Nature Reserves in Post-War Reconstruction has recommended to the Government and to the Departments concerned the institution of an official body, representative of the scientific interests involved, to draw up detailed proposals on the subject of Nature Reserves. The Minister dealing with Post-War Reconstruction consequently suggested that the Conference should itself nominate a body which would draw up detailed proposals and thus be in a position to advise the Government on all matters connected with the preservation of flora and fauna by means of nature reserves. This body, the Nature Reserves Investigation Committee, has now been appointed and has started its investigations.

In discharge of its terms of reference, the Committee wishes for information from all those interested, whether public bodies, societies, or individuals in regard to existing and suggested nature reserves. Information on existing nature reserves already supplied to the Society for the Promotion of Nature Reserves need not be repeated. Forms containing the sort of information required are available and can be obtained from the Honorary Secretary of the Committee, Dr. G. F. Herbert Smith, British Museum (Natural History), London, S.W.7.

W. H. P.

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COMPILED BY W. E. L. WATTAM.

It is not an index in the strictest sense of that term, but it is a classified summary of the contents of the volume, arranged so as to be of assistance to active scientific investigators; the actual titles of papers not always being regarded so much as the essential nature of their contents.

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Yorkshire Naturalists' Union.

President :

Prof. A. C. HARDY, M.A., D.Sc., F.R.S., Hull.

Hon. Secretary :

CHRIS. A. CHEETHAM, F.R.E.S., Austwick, *via* Lancaster.

Hon. Treasurer :

S. D. PERSY FISHER, Sackville Street, Leeds.

The 437th Meeting

WILL BE HELD AT

Horton in Ribblesdale

V.C. 64

WHITSUNTIDE

May 23rd to May 25th, 1942

The alteration from Tadcaster, as given on the Member's Card, is due to catering troubles at the hotel where arrangements had been made.

HEADQUARTERS.—The Golden Lion (Mr. Robinson). Members are asked to write to the Hon. Secretary for accommodation. Terms 13/6 per day. Some private accommodation is available.

TRAVEL FACILITIES.—

		p.m.	p.m.			a.m.	p.m.	p.m.
Leeds	10-30 a.m.	12-12	3-44 <i>Sat. only</i>	Horton	10-28	5- 5	6-46	
Hellifield	12- 5 p.m.	2-32	5-20	Hellifield	10-49	5-40	7- 6	
Horton	12-30 „	2-58	5-46	Leeds	12-33	6-53	9-30	

THE DISTRICT.—The district is rich in plant and animal life due to the varied rocks exposed and to the mountainous type of country. On the occasion of the last meeting of the Union here in June, 1930, much good work was done by the various sections, and it is reported in *The Naturalist*, 1930, pp. 297-300, 333-338, where long lists of plants and insects may be found.

GEOLOGY.—Dr. Versey gave a note on the geology in the Circular 355 for that meeting; he pointed out that the rocks to be seen are: Pre-Cambrian (the Ingletonian series), Ordovician, Silurian, and a series of Carboniferous from Mountain Limestone to Millstone Grit. Botanists must be careful, however, to note the effect of the glaciation which left drift over the whole district. The limestone crevices on Moughton and other places were filled with fine mud which settled out of melting glacial water, at a later stage this clay held up water on these limestone summits, making a series of ponds in which water plants, especially rushes, grew. Later on these were followed by cotton grass and gave rise to peat beds on the limestone. The peat provides a home for ling, heather, crowberry, and other non-calcareous plants on this limestone area. In places pebbles of millstone grit may be seen at rabbit burrows, these show the presence of drift clearly.

We shall visit Penyghent and make the vegetation of the north-western cliffs our object; it will be advisable to leave the question of which day to

weather conditions. The Saxifrages, *oppositifolia* and *aizoides*, with *Draba incana*, *Arenaria verna*, *Galium boreale*, and *Sedum roseum* are interesting plants on the highest Yoredale limestone cliffs (the main limestone of the Yoredales). On these cliffs the mosses *Pseudoleskea catenulata* and *Myurella julacea* may be found. In some of the springheads on the way up *Hypnum giganteum* grows, and amongst the heather the small orchid, *Listera cordata*. During the last meeting Prof. Pearsall found *Polemonium caeruleum* on the cliffs on the eastern side of the hill. The northern summit area has a wide stretch of cloudberry. A Syrphid fly appears to be peculiar to this plant, Verrall suggested that it was *Melanostoma dubium* Zett., but a long series from here was examined by Mr. J. E. Collin and considered to be a melanitic form of *M. mellinum* L. Some old plant records for Penyghent, including *Saxifraga stellaris* and *Salix herbacea*, need verification.

On Moughton the rarer plants are *Veronica spicata* (this is unfortunately omitted in the *Supplement to the Yorkshire Floras* and should be inserted), *Arenaria gothica*, *Silene maritima*, and *Polystichum Lonchitis*, but juniper and the rigid buckler fern provide the finest display. Another interesting area is Helwith Moss, where Bog Andromeda makes a fine show of flowers in May and again in late August. Cranberry is plentiful and *Pyrola minor* and *Sedum Telephium* may be found.

ENTOMOLOGY.—Mr. J. Meikle Brown writes: It was stated in Circular 355 that the district is in need of systematic investigation, and this statement still applies, as the area seems to have been neglected by entomologists, and I have comparatively few records other than those given in our report of the previous meeting (*Naturalist*, 1930, p. 299 *et seq.*). In that report will be found short lists of coleoptera, lepidoptera, and hemiptera, but these should be considerably extended. Hemiptera do not seem to be very abundant, and this may in part be due to the district being comparatively treeless, but species associated with low vegetation should be plentiful, while those more associated with water require investigation. The Tarn should yield interesting species of Corixidæ and Notonectidæ. The less familiar orders should yield good results. The district should be rich in those insect orders associated in the larval stage with water, yet only two Dragonflies (*Enallagma cyathigerum* and *Pyrrosoma nymphula*) are so far recorded, and I have notes of only four species of Caddis-flies, five of May-flies, while Stone-flies number sixteen. Of May-flies the rare *Ameletus inopinatus* occurs near Selside and should be looked for by any of the more upland streams. The local Stone-fly, *Capnia vidua*, has been taken by the writer by becks on both slopes of Penyghent, and *C. nigra* by Ling Ghyll, while *Leuctra moseleyi*, *Nemoura avicularis*, and *Amphinemura standfussi*, not yet recorded, should occur. Good Caddis-flies should occur by Ling Ghyll. *Philopotamus montanus* has been taken on Penyghent, while *Tinodes wæneri*, *Polycentropus flavomaculatus*, and *Rhyacophila dorsalis* occur in the district. My records contain only three species of Neuroptera, and no Psocoptera or Orthoptera. Early Saw-flies should be looked for, and several species of *Dolerus* might be expected. *Trichiosoma lucorum* and *Abia sericea*, both conspicuous insects, occur on Healwith Moss.

FRESHWATER BIOLOGY.—Mr. J. M. Brown writes: The district offers good opportunities for work in freshwater biology, with such different habitats as the Tarn, the river, and the upland becks. Dragon-flies abound near the Tarn, yet we have definite records of two species only. Caddis-flies of the Limnophilid type should be plentiful. Ling Ghyll and some of the smaller becks flowing down Penyghent have been examined on different occasions by the writer and interesting results obtained, but much more might be expected. Stone-flies are plentiful, including *Perlodes mortoni*, *Perla carlukiana*, *P. cephalotes*, *Capnia vidua*, *C. nigra*, and others, but May-flies and Caddis-flies are little known. Larvæ of the micro-caddis, *Hydroptila* sp. occurs on Penyghent, but adults have not been taken. It will be interesting to learn whether the Crayfish is still plentiful in Ling Ghyll.

A tea (2/6) at headquarters at 5-30 p.m., Monday, will be followed by a meeting, when reports will be made on the results of the excursions. The election of new members will take place and we shall be glad to have names of those wishing to join our Union.

Workshire Naturalists' Union.

President :

Prof. A. C. HARDY, M.A., D.Sc., F.R.S., Hull.

Hon. Secretary :

CHRIS. A. CHEETHAM, F.R.E.S., Austwick, *via* Lancaster.

Hon. Treasurer :

S. D. PERSY FISHER, Sackville Street, Leeds.

Divisional Secretary :

C. W. MASON, 15 Park Avenue, Hull.

The 438th Meeting

WILL BE HELD AT

SOUTH CAVE

On Saturday, JUNE 6th, 1942

HEADQUARTERS.—The "Fox and Coney" Hotel, South Cave.

The Manager regrets he will be unable to provide any catering, but hot water will be provided for those who will bring tea.

TRAVEL FACILITIES.—

TRAINS FROM LEEDS TO HULL.

From Leeds	Arrive Hull	From Hull	Arrive Leeds
7-3 a.m.	9-19 a.m.	5-30 p.m.	7-26 p.m.
8-30 a.m.	9-50 a.m.	7-40 p.m.	9-33 p.m.
9-35 a.m.	10-53 a.m.	8-40 p.m.	10-12 p.m.

YORK TO HULL.

From York	Arrive Hull	From Hull	Arrive York
7-45 a.m.	9-26 a.m.	5-0 p.m.	6-3 p.m.
10-15 a.m.	11-28 a.m.	7-30 p.m.	9-15 p.m.

SCARBOROUGH TO HULL.

From Scarboro'	Arrive Hull	From Hull	Arrive Scarboro'
8-16 a.m.	9-38 a.m.	5-30 p.m.	7-35 p.m.

HULL TO SOUTH CAVE

From Hull	Arrive South Cave	From South Cave	Arrive Hull
11-45 a.m.	12-9 p.m.	12-9 p.m.	1-38 p.m.
"	1-12 p.m.	"	"

SOUTH CAVE TO HULL.

From South Cave	Arrive Hull	From Hull	Arrive South Cave
6-5 p.m.	6-34 p.m.	6-34 p.m.	7-9 p.m.
"	6-40 p.m.	"	7-9 p.m.
"	7-43 p.m.	"	8-10 p.m.

BUS SERVICE FROM HULL TO SOUTH CAVE (or attached for Howden).

HULL TO SOUTH CAVE VILLAGE.

RETURN FROM SOUTH CAVE VILLAGE.

From Hull	Arrive South Cave.
9-55 a.m.	10-47 a.m.
12-55 p.m.	1-47 p.m.

From South Cave.	Arr. Hull.
5-48 p.m.	6-48 p.m.
6-49 p.m.	7-48 p.m.
7-48 p.m.	8-48 p.m.

BUS SERVICE.

Hull	9-55 a.m.	12-55 p.m.	2-55 p.m.	4-55 p.m.	8-55 p.m.
S. Cave	10-47 a.m.	1-47 p.m.	3-47 p.m.	5-47 p.m.	9-47 p.m.
Howden	...	2-30 p.m.	4-30 p.m.	6-30 p.m.	10-30 p.m.
Goole	...	2-45 p.m.	...	6-45 p.m.	10-45 p.m.
Selby	...	...	5-8 p.m.	...	...

Selby	8-30 a.m.	...	12-30 p.m.	4-30 p.m.	...
Goole	...	10-55 a.m.	...	2-55 p.m.	...
Howden	9-10 a.m.	11-10 a.m.	1-10 p.m.	3-10 p.m.	5-10 p.m.
S. Cave	...	11-49 a.m.	1-49 p.m.	3-49 p.m.	5-48 p.m.
Hull	10-48 a.m.	12-48 p.m.	2-48 p.m.	4-48 p.m.	6-48 p.m.

ROUTES.—The general body of naturalists, under the leadership of Mr. T. Stainforth, will leave South Cave Station at 12-9 p.m. and proceed by Drewton Lane (first turn on right north of the Station) towards Weedley Springs. After investigation of this area the party will continue eastwards along the road north of, and parallel with the railway cutting to East Dale. Here they will follow the footpath northwards to the Beverley Road, where they will turn left and proceed half a mile to the head of Drewton Dale and St. Austin's Stone. The route is then southwards down the bottom of the dale back to Drewton Lane and South Cave Station and village.

The geological section under the leadership of Mr. C. F. B. Shillito, will visit the Kellaways Rock quarry immediately north-east of the Station, the Millepore Limestone quarry west of the Station, and a new quarry in the Millepore on the Everthorpe Road.

Notes on the District will be found on Circular 369.

TEA AND MEETING.—At Headquarters at 5-0 p.m. Members will have their own tea, and a General Meeting will be held at 5-30 p.m. for the election of New Members and for reports on the result of the excursion.

CIRCULAR No. 439

Yorkshire Naturalists' Union.

The 439th Meeting

WILL BE HELD AT

BOROUGHBRIDGE

On Saturday, JUNE 27th, 1942

for the investigation of the north bank of the Ure

Members will meet on the Bridge at 12-30 p.m. and will carry food. A Meeting will be held if possible at the Black Bull Hotel in the Market Place at 5-30 p.m.

Members should enquire about trams and buses. At the time of writing there is a train from Harrogate at 11-50 a.m., and a return train at 6-37 p.m. No other Circular will be sent out for this Meeting.

Permission to visit their properties has been kindly given by Mr. H. H. Hawking, of Ellenthorpe Lodge, and Mr. C. H. Wilkinson, of Milby.

CIRCULAR No. 440

Yorkshire Naturalists' Union.

President :

Prof. A. C. HARDY, M.A., D.Sc., F.R.S., Hull.

Hon. Secretary :

CHRIS. A. CHEETHAM, F.R.E.S., Austwick, *via* Lancaster.

Hon. Treasurer :

S. D. PERSY FISHER, Sackville Street, Leeds.

The 440th Meeting

WILL BE HELD AT

Clifton Ings, York

On Saturday, JULY 18th, 1942

ARRANGEMENTS.—Members will meet Mr. E. Wilfred Taylor at Clifton Scope at 2 p.m. It is a short walk from there to the Ings. The No. 2 bus, Burdyke Avenue, or No. 8 bus, Burton Lane, can be taken at the Railway Station to Clifton Scope. A convenient train from the West Riding is Leeds 12-25 ; York 1 p.m.

Members arriving earlier could walk from bus or train to Lendal Bridge, and walk along the river bank (nearly a mile) to Clifton Scope.

Tea can be had at several Cafés in York, and Mr. R. Wagstaffe has invited us to hold our Meeting at the Museum, this will be at 6 p.m.

CIRCULAR No. 441

Yorkshire Naturalists' Union.

The 441st Meeting

WILL BE HELD AT

STOCKSMOOR

near SHEPLEY (Huddersfield)

On Saturday, AUGUST 1st, 1942
for the investigation of Stones Woods and Stocks Woods

ARRANGEMENTS.—Meet at Stocksmoor Station, 1 p.m. Trains from Huddersfield at 12-14 p.m. and 12-33 p.m., and returning to Huddersfield at 5-31 p.m. and 6-26 p.m. Bus facilities are meagre : the nearest

route is Huddersfield, Barnsley or Penistone ; alight at Hartley Cottage, Thunder Bridge, and walk *via* Thunder Bridge to Stocksmoor.

Permission to visit the woodlands has been kindly given by Percy Norton, Esq.

Tea will be at the Clothier's Arms, Stocksmoor, 4-30 p.m. Liquid tea and milk (no sugar) at 4d. per head will be available, but members must carry own eatables. This will be followed by a meeting which should give time to catch the 5-30 train.

CIRCULAR No. 442

Yorkshire Naturalists' Union.

The 442nd Meeting

WILL BE THE

FUNGUS FORAY

AT

CAWTHORNE

for Bretton and Deffer Woods

From Saturday, September 19th to
Wednesday, September 23rd, 1942

MYCOLOGICAL COMMITTEE:

Chairman : Mrs. JOHN GRAINGER, M.Sc., Huddersfield.

Convener : Miss J. GRAINGER, Meltham.

Recorders : Dr. J. GRAINGER, Huddersfield ; W. G. BRAMLEY, Bolton Percy.

Rep. on Executive : R. FOWLER JONES, Ilkley.

HEADQUARTERS.—Cinderhills Farm, Cawthorne, near Barnsley. Accommodation is limited and members must be prepared to share rooms. Terms : 7/- per day, but members must bring their own sugar, butter and bacon. Application for rooms should be made to the Convener, Miss J. Grainger, Wilshaw Road, Meltham. If desired the Convener will endeavour to get rooms at a Barnsley Hotel (4 miles away). Day visitors bring own eatables. If possible a day will be arranged at Woolley.

BOOKS AND MAPS.—Members are asked to bring reference books and maps, Ordnance Survey 1 in., large sheet series 37.

PERMISSION to visit his estate has been given by Lord Allendale, for Bretton Park and woodlands.

ANNUAL MEETING.—This meeting will be held at 8 p.m., Saturday, September 19th, unless the number of day visitors renders an earlier hour desirable.

Workroom at Cinderhills Farm, microscopes and books should be brought.

TRAVEL FACILITIES.—The Convener will forward bus times when accommodation is arranged.

THE NEXT MEETING will be the Annual Meeting at Leeds on December 5th, 1942.

Yorkshire Naturalists' Union.

President:

Prof. A. C. HARDY, M.A., D.Sc., F.R.S., Aberdeen.

Hon. Secretary:

CHRIS. A. CHEETHAM, F.R.E.S., Austwick, *via* Lancaster.

Hon. Treasurer:

S. D. PERSY FISHER, Sackville Street, Leeds.

Sectional Meetings, 1942

OCTOBER 3RD.—In the Geological Department of the Leeds University—

Geological Section, 3 p.m.

Freshwater Biology Committee, 3-30 p.m.

Conchological Section, 4 p.m.

OCTOBER 10TH.—**The Botanical Section** will meet in the Botany Common Room, Leeds University, Beech Grove Terrace, at 3 p.m. Business: Annual Reports and Suggestions for Officials and Committee Members for 1943.

OCTOBER 17TH.—**The Vertebrate Section** will meet in the Chapter Hall, Church Institute, Albion Place, Leeds, at 2-30 p.m. Business: Nomination of Officers and Committees.

OCTOBER 24TH.—**The Entomological Section** will meet in the Hook Room, Church Institute, Albion Place, Leeds, at 3 p.m. for the consideration of Reports, Nomination of Officers, Committees, and other business. Members are asked to bring exhibits.

An **Executive Meeting** will be held at the University, Leeds, at 3-30 p.m. on November 2nd, 1942. Will all members of the Executive please make a note of this date and time.

The Annual Meeting of the Union will be held at the University, Leeds, on December 5th, 1942.

YORKSHIRE NATURALISTS' UNION.

For particulars apply to

*The Hon. Secretary, Chris. A. Cheetham, Austwick via Lancaster ;
or to The Hon. Treasurer, S. D. Persy Fisher, Sackville Street, Leeds.*

This form, when filled up and signed, should be sent to the Hon. Secretary of the Union, accompanied by the amount of the first year's subscription.

The Subscription of 15/- entitles the members to receive the Union's magazine, "The Naturalist," as well as the "Transactions."

Persons related to and resident in the family of a member are admitted as 5/- members, to enable them to attend excursions, but not to receive the publications.

Qualification for Life Membership :—A Donation of 11 Guineas.

Yorkshire Naturalists' Union.

.....I9.....

[Signature and Titles.]

.....

[Address.]

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The 443rd Meeting

and 81st Annual Meeting

WILL BE HELD AT

LEEDS

On Saturday, 5th December, 1942

ARRANGEMENTS.—The war-time travelling facilities and black-out make it still necessary to hold our Annual Meeting in a central situation, and Prof. J. H. Priestley has kindly arranged with the Leeds University authorities for us to meet

Haynes

for a second time under war-time difficulties in the University at Leeds. We are still further in debt to them for this help and kind assistance.

PROGRAMME

- 11-0 a.m. **Sectional and Committee Meetings.** The Vertebrate Section will meet in the Committee Room in University House. Other sections will meet in Botany House. These rooms are in Beech Grove Terrace.
- 11-30 a.m. **Executive Meeting** in the Board Room in University House.
- 12 noon. **The General Committee Meeting** in the General Lecture Theatre on the ground floor in the Baines Wing, entrance by the Baines Door, the nearest entrance in University Road, approaching from Woodhouse Lane.
- 1-0 p.m. **Lunch** will be provided at 2/- per head at the Staff House almost immediately opposite the Baines Wing for members who notify Miss L. I. Scott, The University, Leeds, 2, in advance by post-card. November 25th is the latest possible date. Members are earnestly asked **to do this at once and not defer it and then forget** as they often do.
- 2-0 p.m. **The Annual Meeting and the Presidential Address** on
 “ PLANKTON ECOLOGY IN THE SERVICE OF MAN ”
 will be delivered in the General Lecture Theatre.

The Vice-Chancellor of the University, B. Mouat Jones, M.A., will welcome the Union on their visit to Leeds University.

Will members of the **Executive** and of the **General Committee** take note of the above times as no further notice of these meetings will be sent out.

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